PROMISE®
TECHNOLOGY, INC.

SUPERTRAK
EX4650, EX8650, EX8654, EX8658, EX16650
USER MANUAL

Version 3.0 SR3

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This version of the *User Manual* supersedes all previous versions.

Recommendations

In this *Manual*, the appearance of products made by other companies, including, but not limited to software, servers, and physical drives, is for the purpose of illustration and explanation only. Promise Technology does not recommend, endorse, prefer, or support any product made by another manufacturer.

Radio Frequency Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy, and, if not installed and used in accordance with the instruction may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult Promise Technology, Inc. or an experienced radio or TV technician for help.

This device complies with Part 5 of the FCC Rules. Operation is subject to the following conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Caution

Only digital device equipment CERTIFIED CLASS B should be attached to this equipment and that must have shielded cables.

Contents

Chapter 1: Introduction 1
About This Manual 1
Product Overview 2
XOR Microprocessor 2
Hot-Swapping 2
WebPAM PRO Management Software 3
Operating System Support 3
Browser Support 4
Key Features and Benefits 4
Specifications 6

Chapter 2: Installation 7
Unpacking the SuperTrak Card 7
Installing the SuperTrak Card 9
Connecting SuperTrak to a SuperSwap Enclosure 14
Connecting SuperTrak to a VTrak JBOD Enclosure 14
SAS Connections and ID Numbers 15
Choosing the Physical Drives 17
Creating a Logical Drive 18
Installing the CLI 23
Installing onto Windows 23
Installing onto Linux 29
Installing the CLI onto FreeBSD 36
Installing the CLI onto VMware 37
Installing WebPAM PRO 38
Utility Server 38
Agent 38
JRE 39
Internet Browser 39
Installing WebPAM PRO onto Windows 40
Installing WebPAM PRO onto Linux 49
Logging into WebPAM PRO 58
Logging in at the Host PC 58
Logging in over the Network 58
Login Screen 59
Setting up WebPAM PRO 60

Chapter 3: Installing Drivers 63
Driver Installation Media 64
Windows 64
Linux and FreeBSD 65
Windows Server 2008 66
New OS Installation 66
Existing System 67
Confirming Driver Installation 67
Windows Vista 68
New OS Installation 68
Existing System 69
Confirming Driver Installation 69
Windows Server 2003 70
New OS Installation 70
Existing System 71
Confirming Driver Installation 71
Windows XP 72
New OS Installation 72
Existing System 73
Confirming Driver Installation 73
Red Hat Linux Enterprise 4.4, 4.5, 4.6, 4.7 74
New OS Installation 74
Existing System 74
Fedora Core 6 75
New OS Installation 75
Existing System 75
Fedora Core 7, 8 76
New OS Installation 76
Existing System 76
openSUSE 10.2, 10.3, 10.5, 11 77
New OS Installation 77
Existing System 77
SLES 10, 10 SP1, 10 SP2 78
New OS Installation 78
Existing System 78
Miracle Linux 4 79
New OS Installation 79
Existing System 79
FreeBSD 6.1, 6.2, 6.3, 7.0 80
New OS Installation 80
Existing System 81

Chapter 3: Installing Drivers, cont.
VMware ESX Server 3.0.2, 3.5.0 82
New OS Installation 82
Existing System 82

Chapter 4: SuperBuild™ Utility 85
SuperTrak BIOS 85
Accessing the Main Menu 88
Selecting a Controller 89
Viewing Controller Information 89
Managing Physical Drives 90
Viewing Physical Drives 90
Viewing Physical Drive Information 90
Managing Physical Drive Problems 91
Managing Disk Arrays 92
Viewing Disk Arrays 92
Viewing Disk Array Information 92
Creating a Disk Array 93
Changing Disk Array Settings 94
Rebuilding a Disk Array 94
Deleting a Disk Array 94
Managing Logical Drives 95
Viewing Logical Drives 95
Viewing Logical Drive Information 95
Creating a Logical Drive 96
Initializing a Logical Drive 97
Changing Logical Drive Settings 98
Deleting a Logical Drive 98
Managing Spare Drives 99
Viewing Spare Drives 99
Viewing Spare Drive Information 99
Creating a Spare Drive 99
Changing Spare Drive Settings 100
Deleting a Spare Drive 101
Viewing Background Activity 102
Managing the Event Log 103
Viewing RAM Events 103
Viewing NVRAM Events 103
Clearing the Event Logs 104

Chapter 4: SuperBuild™ Utility, cont.

Working with Time Sync 105
Setting the Time Zone 105
Synchronizing Time with an Embedded Site 105
Using the Miscellaneous Menu 106
Making the SAS Ready LED Setting 106
Making the SGPIO Backplane Setting 106
Working with the Buzzer 106

Chapter 5: Management with WebPAM PRO 109
Logging into WebPAM PRO 109
Logging in at the Host PC 109
Logging in over the Network 110
Login Screen 111
Accessing the Interface 112
Using the Header 113
Using Tree View 113
Using Management View 114
Choosing a Display Language 115
Viewing the Event Frame 115
Saving the Event Frame 116
Deleting the Event Frame 116
Viewing the Storage Network 116
Logging out of WebPAM PRO 117
Managing Users 118
Viewing User Information 118
Making User Settings 118
Making Your Own User Settings 119
Changing a User's Password 119
Changing Your Own Password 119
Creating a User 120
Deleting a User 120
Working with Subsystem/Host Management 122
Viewing Subsystem/Host Information 122
Adding a Subsystem or Host 122
In-Band versus Out-of-Band 123
Deleting a Subsystem or Host 123
Setting User Privilege 124
Updating the Firmware on Multiple Systems 124

Chapter 5: Management with WebPAM PRO, cont.

Managing Software Services 126
Viewing Service Status 126
Changing Web Server Settings 126
Restarting the Tomcat Server 127
Setting up Email Service 127
Setting up Extended SMTP 128
Sending A Test Email Message 128
Setting Event Frame Refresh Time 128
Changing CIM Client Settings 129
Changing CIM Server Settings 129
Managing the Host 130
Viewing Host Information 130
Setting User Rights 130
Refreshing the WebPAM PRO Screen 130
Managing the Subsystem 131
Viewing Subsystem Information 131
Clearing Statistical Data 132
Setting an Alias for the Subsystem 132
Updating the Firmware 132
Checking Subsystem Health 133
Viewing the Runtime Event Log 134
Saving the Runtime Event Log 134
Clearing the Runtime Event Log 135
Viewing the NVRAM Event Log 135
Saving the NVRAM Event Log 136
Clearing the NVRAM Event Log 136
Viewing Current Background Activities 136
Making Background Activity Settings 137
Running Background Activities 138
Running Media Patrol 138
Running PDM 138
Viewing Scheduled Activities 139
Scheduling an Activity 139
Deleting a Scheduled Activity 141
Viewing System Configuration 141
Managing the Controller 142
Viewing Controllers Information 142
Viewing Controller Information 142
Viewing Controller Statistics 144

Chapter 5: Management with WebPAM PRO, cont.

Managing the Controller, cont.
Making Controller Settings 144
Clearing an Orphan Watermark 145
Viewing Battery Information 145
Silencing the Buzzer 146
Making Buzzer Settings 146
Testing the Buzzer 146
Viewing Buzzer Information 147
Managing Enclosures 148
Viewing Enclosure Information 148
Managing Physical Drives 149
Viewing a List of Physical Drives 149
Locating a Physical Drive 149
Making Global Physical Drive Settings 150
Viewing Physical Drive Information 151
Viewing Physical Drive Statistics 151
Making Physical Drive Settings 152
Clearing Stale and PFA Conditions 152
Viewing the SMART Log 153
Viewing Advanced SMART Log Information 154
Saving Advanced SMART Log Information 155
Making SMART Log Settings 155
Managing Disk Arrays 156
Viewing Disk Arrays 156
Locating a Disk Array 156
Creating a Disk Array 157
Creating a Disk Array – Automatic Configuration 158
Creating a Disk Array – Express Configuration 159
Creating a Disk Array – Advanced Configuration 161
Deleting a Disk Array 163
Viewing Disk Array Information 163
Making Disk Array Settings 164
Creating a Logical Drive 165
Deleting a Logical Drive 166
Migrating a Disk Array 167
Rebuilding a Disk Array 168
Running Media Patrol on a Disk Array 169
Running PDM on a Disk Array 169
Transitioning a Disk Array 170
Preparing a Disk Array for Transport 171

Chapter 5: Management with WebPAM PRO, cont.
Managing Logical Drives 172
Viewing Information for All Logical Drives 172
Locating a Logical Drive 173
Viewing Logical Drive Information 173
Viewing Logical Drive Statistics 174
Changing Logical Drive Settings 174
Initializing a Logical Drive 175
Running Redundancy Check 176
Viewing the Logical Drive Check Table 176
Managing Spare Drives 178
Viewing a List of Spare Drives 178
Creating a Spare Drive 179
Deleting Spare Drive 180
Making Spare Drive Settings 180
Running Spare Check 181
Working with the Logical Drive Summary 182
Viewing a List of All Logical Drives 182
Locating a Logical Drive 182
Viewing Individual Logical Drive Information 183

Chapter 6: Management with the CLI 185
Opening the CLI on Windows 185
Opening the CLI on Linux, FreeBSD, and VMware 186
Table of Supported Commands 187
Notes and Conventions 189
List of Supported Commands 190

Chapter 7: Technology Background 227
Introduction to RAID 227
RAID 0 – Stripe 228
RAID 1 – Mirror 229
RAID 1E – Enhanced Mirror 230
RAID 5 – Block Striping with Distributed Parity 231
RAID 6 – Block and Double Parity Stripe 232
RAID 10 – Mirror / Stripe 233
RAID 50 – Striped Distributed Parity 234
RAID 60 – Striping of Double Parity 237

Chapter 7: Technology Background, cont.

Choosing a RAID Level 240
RAID 0 240
RAID 1 240
RAID 1E 241
RAID 5 241
RAID 6 242
RAID 10 242
RAID 50 243
RAID 60 243
Choosing Stripe Block Size 244
Choosing Sector Size 244
2 TB Limitation 245
Choosing Cache Policy 245
Read Cache Policy 246
Write Cache Policy 246
Capacity Coercion 246
Initialization 247
Hot Spare Drive 248
Partition and Format the Logical Drive 248
RAID Level Migration 248
RAID 0 249
RAID 1 250
RAID 1E 250
RAID 5 251
RAID 6 251
RAID 10 252
RAID 50 252
RAID 60 253
Ranges of Disk Array Expansion 253
Media Patrol 255
Predictive Data Migration (PDM) 255
PDM Triggers 255
Transition 256
Drive Failure and Automatic Rebuild 256
Automatic Transition 258
Manual Transition 258

Chapter 8: Troubleshooting 261
Problems Reported by SuperTrak 261
Buzzer 261
LEDs 261
BIOS 263
Problems Reported in WebPAM PRO 265
Opening WebPAM PRO 265
What to Look For 265
Critical & Offline Logical Drives 267
Finding the Failed Drive in SuperBuild 267
Finding the Failed Drive in WebPAM PRO 268
Salvaging Physical Drives 269
Clearing Stale and PFA Conditions 269
Rebuilding a Disk Array Automatically 270
Rebuilding a Disk Array Manually 270
Rebuilding with WebPAM PRO 270
Rebuilding with SuperBuild 271
Recovering from a Blank Screen 272
Cache Battery Does Not Charge 272

Chapter 9: Support 273
Frequently Asked Questions 273
Pre-Installation (Speed, Device Types, Capacity, Cabling) . .273
Drive Issues 274
Installation Issues (Capacity, Booting) 275
Post-Installation 276
Contacting Technical Support 277
Limited Warranty 280
Disclaimer of other warranties 280
Your Responsibilities 281
Returning the Product For Repair 282

Appendix A: Partition and Format 285

Appendix B: Upgrades 289
Updating SuperTrak BIOS and Firmware 289
Downloading BIOS and Firmware File 289
Updating WebPAM PRO 290
Downloading the WebPAM PRO Update File 290
Installing the WebPAM PRO Update File 290
Logging into WebPAM PRO 290

Appendix C: Battery Backup Unit 291
Installing the BBU 292

Appendix D: LED Backplane Connections 295
Schematic Diagrams 295
Direct LED Display 297
Aggregate LED Display 297
Global LED Display 298

Index. 299

Chapter 1: Introduction

- About This Manual, below
- Product Overview (page 2)
- WebPAM PRO Management Software (page 3)

Thank you for purchasing one of Promise Technology's SuperTrak EX4650, EX8650, EX8654, EX8658, or EX16650 SAS/SATA RAID Controller card.

About This Manual

This *User Manual* describes how to setup, use and maintain the SuperTrak RAID controller. It also describes how to use the Web-Based Promise Array Management—Professional (WebPAM PRO) RAID management software.

This manual includes a full table of contents, chapter task lists and numerous cross-references to help you find the specific information you are looking for.

Also included are four levels of notices:

Note

A *Note* provides helpful information such as hints or alternative ways of doing a task.

Important

Important calls attention to an essential step or point required to complete a task. Important items include things often missed.

Caution

A *Caution* informs you of possible equipment damage or loss of data and how to avoid them.

Warning

A *Warning* notifies you of probable equipment damage or loss of data, or the possibility of physical injury, and how to avoid them.

Product Overview

SuperTrak EX4650, EX8650, EX8654, EX8658, and EX16650 are SAS and SATA RAID Controller cards. When used with WebPAM PRO software, the SuperTrak RAID Controllers offer a feature-rich, secure and versatile enterprise-wide RAID solution. In addition, the SuperTrak EX Series supports RAID expansion. The resulting RAID environment allows users and administrators to configure, manage, and monitor everything from single logical drives on local systems to logical drive networks residing in offsite locations.

The SuperTrak EX Series RAID Controller cards support SAS hard drives as well as 1.5 Gb/s and 3.0 Gb/s SATA hard drives. At its core, the SuperTrak card provides advanced RAID management functions: creating logical drives, monitoring them, keeping them online and operating at optimum efficiency. SuperTrak can also perform many other tasks, such as:

- The SuperTrak EX4650 Controller card supports up to four SAS or SATA physical drives and RAID levels 0, 1, 1E, 5, 6, and 10. With a SAS expander you can attach up to 128 drives. This Controller also supports RAID 50 and 60 with a SAS expander.
- The SuperTrak EX8650, EX8654, EX8658, and EX16650 Controller cards you can directly attach up to 16 SAS or SATA physical drives. With a SAS expander you can attach up to 256 drives. These Controllers also support RAID levels 0, 1, 1E, 5, 6, 10, 50, and 60.
- Set up a network of SuperTrak RAID servers (all running under different RAID levels) and monitor those servers from any workstation on the network.
- Create a series of SuperTrak RAID networks at any number of offsite locations.
- Monitor and repair SuperTrak RAID logical drives using the Internet from an offsite location—all without compromising the integrity of secure servers.

XOR Microprocessor

The SuperTrak EX Series Controllers have an onboard microprocessor for XOR calculations, which off loads the parity calculation workload from the main CPU and transfers it to the controller card, boosting the performance of the entire system.

Hot-Swapping

Attached drives can be *hot swapped* when necessary.

WebPAM PRO Management Software

The Web-Based Promise Array Management—Professional (WebPAM PRO) software offers local and remote management and monitoring of all SuperTrak logical drives that exist anywhere on a network. Browser-based GUI provides email notification of all major events or alarms, memory cache management, drive event logging, logical drive maintenance, rebuild, and access to all components in the RAID configuration (controller, physical drives, disk arrays, logical drives, physical drives, and enclosure).

For information on using WebPAM PRO, see “Chapter 5: Management with WebPAM PRO” on page 109.

Operating System Support

On the Host PC where you install the SuperTrak controller and WebPAM PRO, Promise Technology recommends:

- Windows Server 2008 (64 bit) with or without Hyper-V
- Windows Server 2008 (32 bit)
- Windows Vista (32 or 64 bit)
- Windows Server 2003 SP1, SP2; R2 (32 or 64 bit)
- Windows XP Professional SP2, SP3 (32 or 64 bit)
- Red Hat Enterprise Linux 4.4, 4.5, 4.6, 4.7, 5.0, 5.1, 5.2 (32 or 64 bit)
- openSUSE 10.2, 10.3, 11 (32 or 64 bit)
- SLES 10, 10 SP1, 10 SP2 (32 or 64 bit)
- Miracle Linux 4 SP2, 5 (32 or 64 bit)
- Fedora Core 6, 7, 8, 9 (32 or 64 bit)
- Open Source Driver for Linux 2.6 kernel (32 or 64 bit)

SuperTrak management on the following OS is supported only via CLI:

- FreeBSD 6.1, 6.2, 6.3, 7.0 (32 or 64 bit)

SuperTrak management on the following virtualization platform is supported only via CLI:

- VMware ESX 3.0.2, 3.5 (certification pending)

Browser Support

On the Host PC where you install the SuperTrak controller and WebPAM PRO, you must have one of the following browsers:

- Internet Explorer
- Firefox
- Netscape Navigator

If you do not have one of the above browsers, install the browser first and make it the default browser. Then install WebPAM PRO.

Key Features and Benefits

The following information offers an overview of the major features of the Promise SuperTrak EX4650, EX8650, EX8654, EX8658, and EX16650.

Advanced Design	
Features	**Benefits**
Supports PCIe x8 bus motherboards	Allows maximum data transfers of up to 2 GB/s in both directions simultaneously to dramatically reduce the time to save and retrieve large files.
EX4650 supports: RAID 0, 1, 1E, 5, 6, and 10. RAID 50 and 60 with SAS Expander.	Provides dramatic increase in drive performance and/or fault tolerant options. Offers performance customization and data rebuilds from the BIOS menu.
EX8650, EX8654, EX8658, and EX16650 support: RAID 0, 1, 1E, 5, 6, 10, 50, and 60	
Supports Serial ATA Specification II	Burst data transfer rates up to 300 MB/s from Serial ATA drives to boost overall system performance.
Supports Serial Attached SCSI Specification	Burst data transfer rates up to 300 MB/s from SAS drives to boost overall system performance.
Independent data channels for SATA and SAS drives	Drives can multiply their data transfer performance when striped together and each drive uses a separate data channel.
Supports multiple logical drives on the same physical drives	Up to 32 logical drives per array, Up to 128 arrays drives per controller, Up to 256 physical drives per controller, Up to 256 logical drives per controller.

Advanced Design	
Features	**Benefits**
Supports online logical drive expansion	Add disk drives to the array without affecting data availability.
Supports online logical drive migration	Change RAID level without affecting data availability.
Utilizes SuperBuild™ automenu from the SuperTrak onboard BIOS	Has “Auto Setup” option for quick and easy logical drive builds.
Displays status and error checking messages during bootup	Notifies user of possible errors and allows for recovery of mirrored drive logical drives directly from SuperBuild™.
Supports S.M.A.R.T. monitoring and reporting	Polls status at set intervals, reports through WebPAM PRO.
Employs the latest Promise PCI Express SATA/SAS ASIC technology	Fully supports Serial ATA specifications with 150 and 300 MB/sec timing and CRC error-checking at high speeds.
Automatic background rebuilds	Fault tolerance can be restored automatically without rebooting.
DOS based flash upgrade of BIOS and Firmware	Verifies proper file, option to backup existing file. Download files from Promise website.
Capacity coercion	Supports four schemes of capacity coercion.
System reboot not required after create, delete, migrate or expand logical drive	System boot process continues without restarting.

Compatibility	
Features	**Benefits**
Complies with PCI Express Specification 1.0a	Provides highest level of hardware compatibility
Complies with SATA Specification 1.0a	Provides full compatibility with first generation SATA hard drives.
Complies with SATA II: Extensions to SATA 1.0a Specification	Provides enclosure and drive monitoring compatibility.
Complies with SAS Specification 1.1	Provides full compatibility with SAS hard drives.

Compatibility	
Features	**Benefits**
Tested compatibility to coexist with motherboards that have integrated IDE controllers	Improves system performance and minimizes system conflicts for new and existing installations.
Features LBA support	Supports drives greater than 137 GB capacity.
Supports BIOS Boot Specification	All logical drives attached to the SuperTrak card appear in the BBS-compliant motherboards BIOS boot list.

Specifications

- Port Counts and Connectors
  EX4650: 4 internal, one SFF-8087
  EX8650: 8 internal, two SFF-8087
  EX8654: 4 internal, one SFF-8087; 4 external, one SFF-8088
  EX8658: 8 external, two SFF-8088
  EX16650: 16 internal, four SFF-8087
- Interface: PCI-Express x8 Slot
- I/O Processor
  EX4650: 667 MHz
  EX8650: 800 MHz
  EX8654, EX8658, EX16650: 1.2 GHz
- Memory (DDR-II)
  EX4650: 128 MB
  EX8650: 256 MB
  EX8654, EX8658, EX16650: 512 MB
- Controller card dimensions (HWD):
  EX4650, EX8650, EX8654, EX8658:
  2.69 x 6.63 x 0.75 inches (68.3 x 168.3 x 19.0 mm) “Low profile”
  EX16650:
  4.37 x 6.63 x 0.75 inches (111.0 x 168.3 x 19.0 mm) “Full height”
- Operating temperatures
  Without BBU: 32° to 122°F (0°C to 50°C)
  With BBU: 32° to 104°F (0°C to 40°C)
- Operating humidity: 5% to 95% non-condensing

Chapter 2: Installation

- Unpacking the SuperTrak, below
- Installing the SuperTrak Card (page 9)
- Choosing the Physical Drives (page 17)
- Creating a Logical Drive (page 18)
- Installing the CLI (page 23)
  - Windows (page 23)
  - Linux (page 29)
  - Free BSD (page 36)
  - VMware (page 37)
- Installing WebPAM PRO (page 38)
  - Windows (page 40)
  - Linux (page 49)
- Logging into WebPAM PRO (page 58)
- Setting up WebPAM PRO (page 60)

Unpacking the SuperTrak Card

When you receive the SuperTrak EX Series SAS/SATA RAID Controller card, the package should contain the items listed below:

- SuperTrak EX4650, EX8650, EX8654, EX8658, or EX16650 Controller card
- *Quick Start Guide*
- 0.5m (19-inch) SFF-8087 to SFF-8087 multi-lane cable
  One (1) for EX4650 and EX8654
  Two (2) for EX8650
  Four (4) for EX16650
- CD with WebPAM PRO software, Windows and Linux drivers, and *SuperTrak User Manual*

If any of the items are missing or appear damaged, please contact your dealer or distributor immediately.

Warning

The electronic components on the SuperTrak EX Controller cards are sensitive to damage from Electro-Static Discharge (ESD). Observe appropriate precautions at all times when handling the SuperTrak card or its subassemblies.

Warning

Before installing the SuperTrak EX Controller card into an existing system, backup any important or useful data. Failure to follow this accepted PC practice could result in data loss.

Important

Promise does not recommend multi-lane and fanout cables longer than 1m (38 inches) because they have not been tested with the SuperTrak controller.

Important

If your SuperTrak EX16650 card has a battery backup unit (BBU), follow these requirements to be sure the battery charges properly:

- Ambient operating temperature must not exceed 104°F (40°C)
- Airflow through your PC or server must be at least 200 LFM

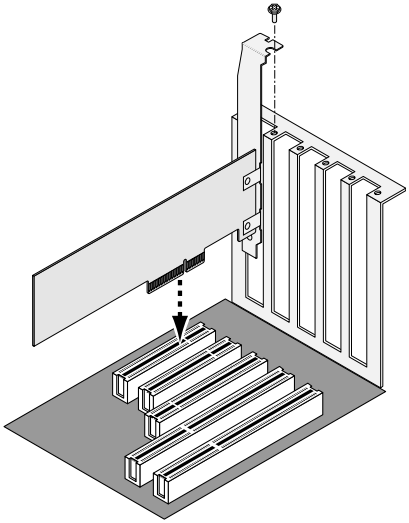
Note

The SuperTrak EX Controller cards are PCI Plug-n-Play (PnP) devices. No changes are necessary in the motherboard CMOS or BIOS Setup for resources or drive types in most applications.

Installing the SuperTrak Card

The SuperTrak EX Controller card fits into any available PCI-Express x8 slot. You can also plug the SuperTrak card into a PCI-Express x16 slot.

1. Remove the cover of your system.
2. Remove the inside slot cover of an available PCI-Express slot on the motherboard.



3. Install the SuperTrak card into the open PCI-Express slot.
4. Fasten the SuperTrak card bracket to the system case.
5. Attach one end of a SAS multi-lane cable to a SAS port on the SuperTrak card.

   External SAS multi-lane cables are user-supplied. The external SAS ports have SFF-8088 connectors.

   See Figures 1 through 5.

Figure 1. SuperTrak EX4650 card

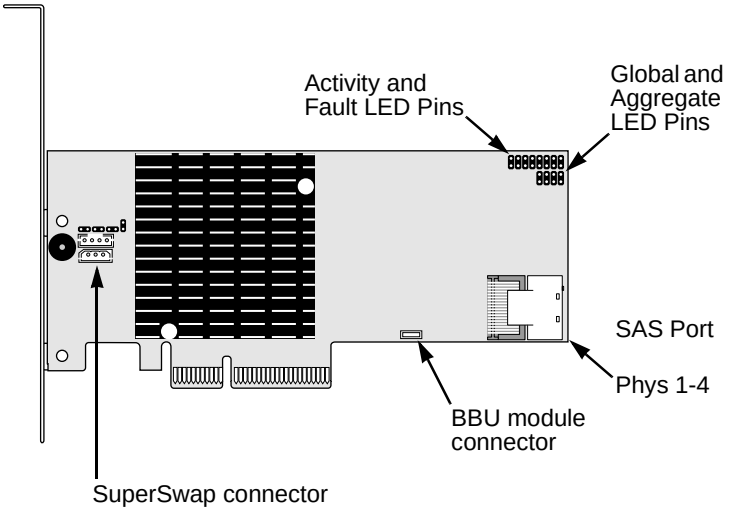


Figure 2. SuperTrak EX8650 card

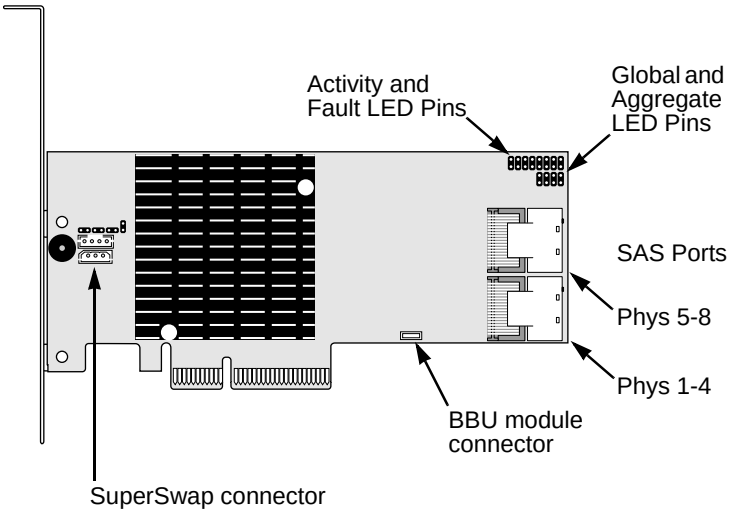


Figure 3. SuperTrak EX8654 card

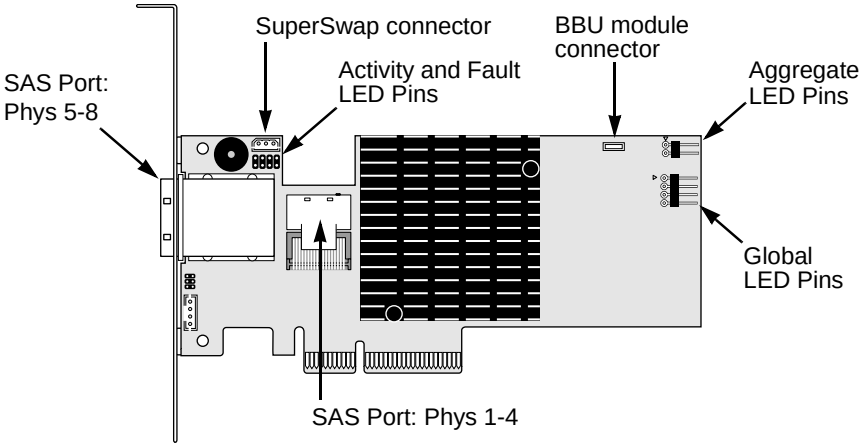


Figure 4. SuperTrak EX8658 card

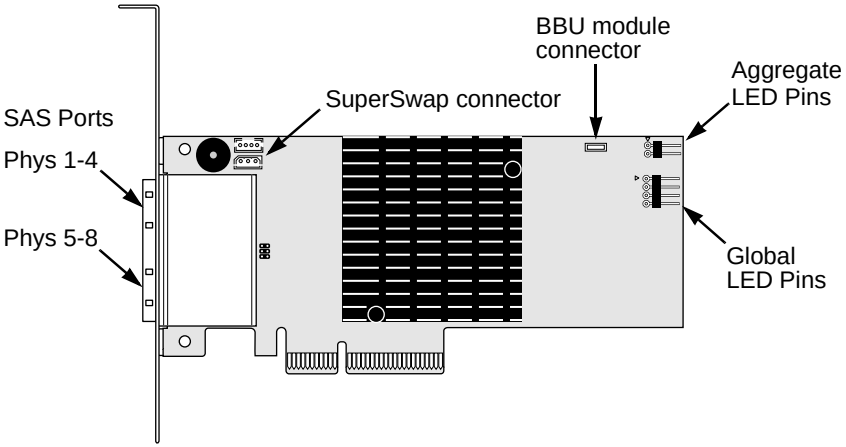
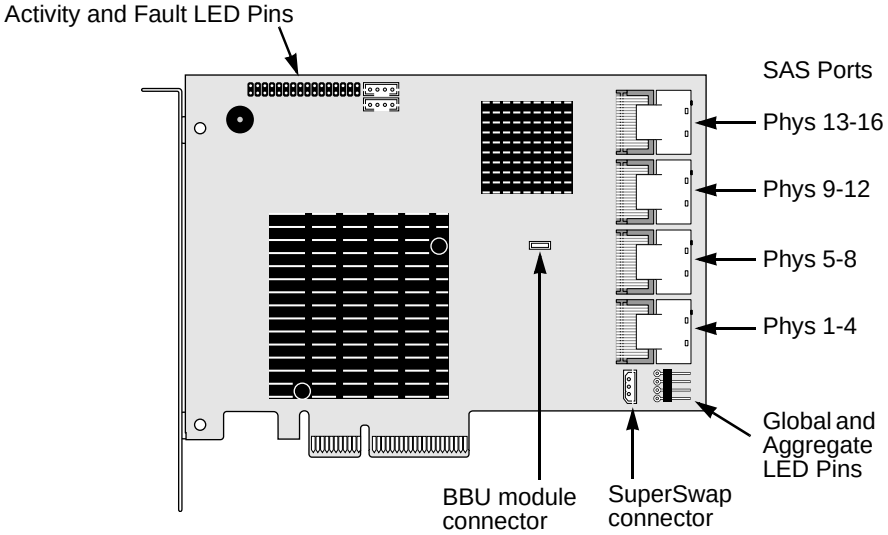


Figure 5. SuperTrak EX16650 card



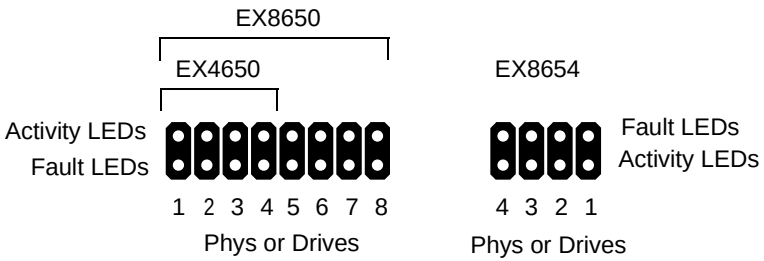
6. Attach the other end of the SAS multi-lane cable to a SAS port on your enclosure's backplane or to your SAS expander.

   For more information, see the user manual for your enclosure or SAS expander.

7. Optional. Repeat steps 5 and 6 for the other SAS ports on the SuperTrak EX8650, EX8654, EX8658, or 16650 card.
8. Optional. Attach cables from the LED pins on the SuperTrak card to the LEDs in your PC or enclosure. See Figures 5 through 7.

   For more information, see "Appendix D: LED Backplane Connections" on page 295 and the user manual for your PC or enclosure.

Figure 6. Individual LED pins, EX4650, EX8650, and EX8654



For SuperTrak EX8654 and EX8658, note that only the *interior* SAS Port Phys have individual LED pins.

Figure 7. Individual LED pins, EX16650

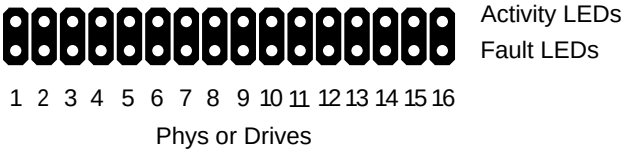


Figure 8. Global and Aggregate LED pins, EX4650 and EX8650

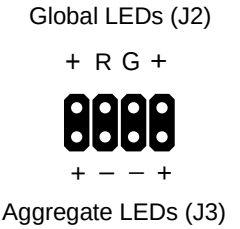


Figure 9. Global and Aggregate LED pins, EX8654 and EX8658

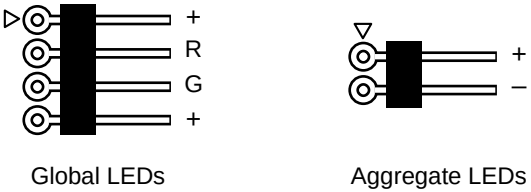


Figure 10. Global and Aggregate LED pins, EX16650

Connecting SuperTrak to a SuperSwap Enclosure

If you are using Promise SuperSwap enclosures:

1. Attach SAS fanout cables to the SAS ports of the SuperTrak card.
2. Connect the other ends of the SAS fanout cables to the SuperSwap enclosure.
3. Connect the 3-to-3 pin management cable (came with the SuperSwap) from the SuperSwap connector on SuperTrak card to the Management connector on the back of the SuperSwap housing.
4. Optional. If you are installing multiple SuperSwap 4600s, install a 6-pin daisy-chain cable from the daisy-chain OUT connector of the first SuperSwap to the daisy-chain IN connector of the second.

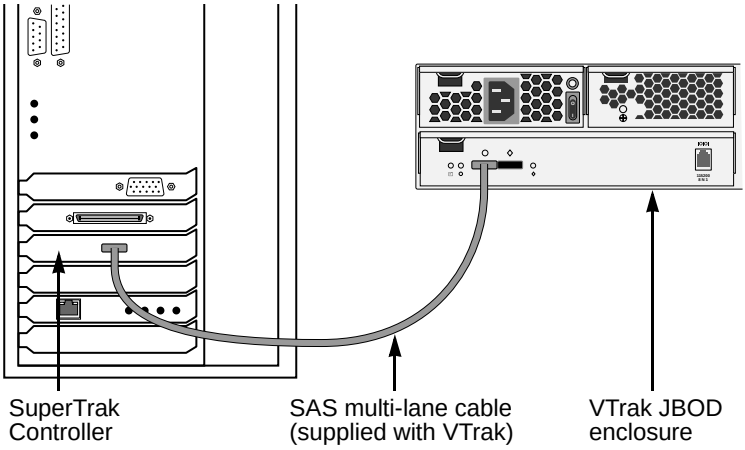
   SuperTrak supports up to eight SuperSwap 1600 enclosures or up to two SuperSwap 4600 enclosures.

Connecting SuperTrak to a VTrak JBOD Enclosure

If you are connecting the SuperTrak card to a single VTrak JBOD enclosure, you can attach the SAS multi-lane cable to either the **circle** or **diamond** port on the enclosure.

However, if you plan to cascade multiple VTrak JBOD enclosures, you must attach the SAS multi-lane cable to the **circle** port on the first enclosure.

Figure 11. Attaching the SAS multi-lane cable to the diamond port



SAS Connections and ID Numbers

The table below correlates the ranges of Enclosure IDs and Physical Drive IDs, that appear in the WebPAM PRO interface as a result of the data connections you make.

SuperTrak SAS Port	Enclosure ID Range	Drive ID Range
Phys 1-4 Virtual*	1	1 to 128
Phys 1-4	2 to 9	1 to 128
Phys 5-8	10 to 17	129 to 256
Phys 9-12	18 to 25	257 to 384
Phys 13-16	26 to 33	385 to 512

* A virtual enclosure involves physical drives attached directly to the SuperTrak controller or a connection to an SGPIO backplane.

You can attach up to 128 SAS or SATA drives on each SAS port using SAS expanders.

The SuperTrak EX8650, EX8654, and EX8658 cards are designed to manage up to 16 enclosures and up to 256 SAS or SATA disk drives (using SAS expanders).

The SuperTrak EX16650 card is designed to manage up to 32 enclosures and up to 512 SAS or SATA disk drives (using SAS expanders).

If your system has fewer components, you might be surprised at the way WebPAM PRO numbers your enclosures and drives. The following scenarios illustrate some numbering examples.

Scenario 1: Virtual Enclosure – SGPIO

You install the SuperTrak card into an SGPIO enclosure. You attach a SAS data cable between SAS Port Phys 1-4 and the enclosure's backplane.

In WebPAM PRO, the SGPIO enclosure appears as Enclosure 1. The drives are numbered 1 to 128.

If you attached a second SGPIO enclosure to SAS Port Phys 5-8, it would appear in WebPAM PRO as Enclosure 10. The drives would be numbered 129 to 256.

Scenario 2: Virtual Enclosure – Host PC

You install the SuperTrak card into a Host PC. You attach SAS breakout cables to SAS Ports Phys 1-4 and Phys 5-8 and a SAS or SATA drive at the drive ends of each cable.

In WebPAM PRO, the Host PC appears as Enclosure 1. The drives on SAS Port Phys 1-4 are numbered 1 to 4. The drives on SAS Port Phy 5-8 are numbered 129 to 132.

This scenario also applies if you use Promise SuperSwap enclosures.

Scenario 3: External Enclosures – Daisy Chain

You install the SuperTrak card into a Host PC. You attach a SAS data cable between SAS Port Phys 1-4 and a Promise VTrak J310s 12-drive JBOD enclosure. You connect a second J310s enclosure to the first in a daisy chain.

In WebPAM PRO, the first JBOD enclosure appears as Enclosure 2. The drives are numbered 1 to 12. The second JBOD enclosure appears as Enclosure 3. The drives are numbered 13 to 24.

Scenario 4: External Enclosures – Parallel

You install the SuperTrak card into a Host PC. You attach a SAS data cable between SAS Port Phys 1-4 and a VTrak J310s enclosure. You attach a SAS data cable between SAS Port Phys 5-8 and a second J310s enclosure.

In WebPAM PRO, the first JBOD enclosure appears as Enclosure 2. The drives are numbered 1 to 12. The second JBOD enclosure appears as Enclosure 10. The drives are numbered 129 to 140.

Scenario 5: SAS Expanders

You install the SuperTrak card into a Host PC. You attach a SAS data cables between SAS Port Phys 1-4 and Phys 5-8 and two SAS Expanders.

In WebPAM PRO, the first Expander appears as Enclosure 2. The drives are numbered 1 to 128. The second Expander appears as Enclosure 10. The drives are numbered 129 to 256.

See “Viewing Enclosure Information” on page 148 and “Locating a Physical Drive” on page 149 for more information.

Choosing the Physical Drives

The SuperTrak EX Controller card supports:

- SAS physical drives
- SATA 3.0-Gb/s physical drives
- SATA 1.5-Gb/s physical drives
- Hard Disk Drives (HDD)
- Solid State Drives (SSD)

For optimal performance, install physical drives of the same model and capacity.

Level	Number of Drives	Level	Number of Drives
RAID 0	1 or more	RAID 6	4 to 16*
RAID 1	2 only	RAID 10	4 or more**
RAID 1E	3 or more	RAID 50	6 or more
RAID 5	3 to 16*	RAID 60	8 or more
* Requires SAS expansion ** Requires an even number of drives			

The table above shows the number of drives required for each RAID level.

Note

You cannot mix HDDs and SSDs in the same disk array. If you attempt to create an array with HDDs and SSDs, the Controller will create two separate disk arrays, each with the specified number of logical drives.

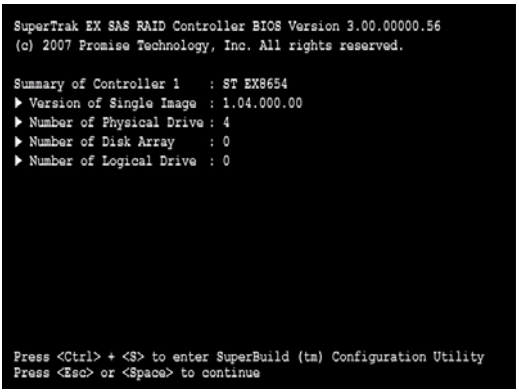
Creating a Logical Drive

You can use the SuperBuild™ Configuration Utility to create a logical drive with the attached physical drives. Even if you plan to use the WebPAM PRO software to manage your logical drives, you can still create your first logical drive using the SuperBuild Utility, as described here.

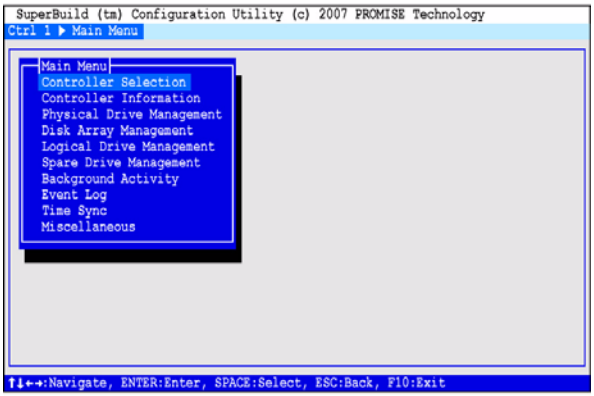
Note

For an explanation of the logical drive concepts and the choices you can make when you create your logical drive, see “Chapter 7: Technology Background” on page 227 of this manual.

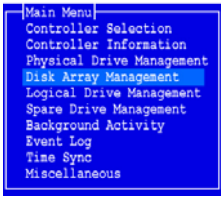
1. Boot your system. If this is the first time you have booted with the SuperTrak card and physical drives installed, the SuperTrak BIOS will display the following screen.


SuperTrak EX SAS RAID Controller BIOS Version 3.00.00000.56
(c) 2007 Promise Technology, Inc. All rights reserved.
Summary of Controller 1 : ST EX8654
Version of Single Image : 1.04.000.00
Number of Physical Drive : 4
Number of Disk Array : 0
Number of Logical Drive : 0
Press <Ctrl> + <S> to enter SuperBuild (tm) Configuration Utility
Press <Esc> or <Space> to continue

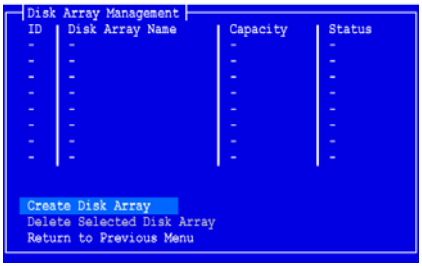
2. Press the Ctrl-S keys to display the SuperBuild Utility Main Menu.



3. Press the arrow keys to highlight *Disk Array Management* and press Enter.

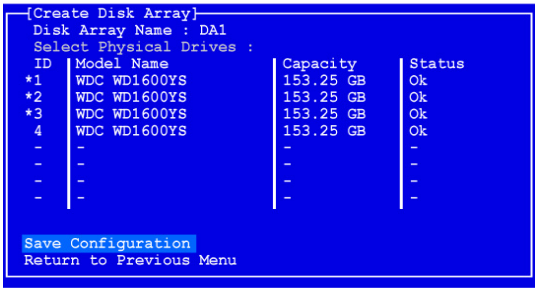


The Disk Array Management screen appears.



4. Highlight *Create Disk Array* and press Enter.

   The Create Disk Array screen appears.



   Use this screen to select the physical drives for your disk array.

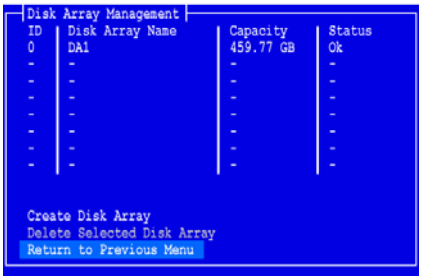
5. Press the arrow keys to highlight a physical drive. Then press the spacebar to select the physical drive.

   An asterisk (*) appears at the left of each selected physical drive.

6. Highlight *Save Configuration* and press Enter.

   The Disk Array Management screen appears, showing your new disk array

7. Highlight *Return to Previous Menu* and press Enter.

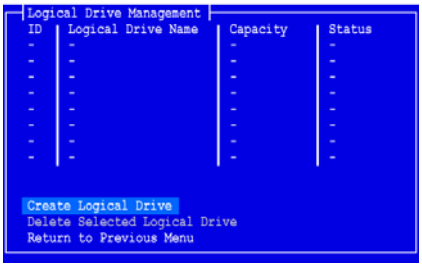


The Main Menu appears.

8. Highlight *Logical Drive Management* and press Enter.

The Logical Drive Management screen appears.

9. Highlight *Create Logical Drive* and press Enter.

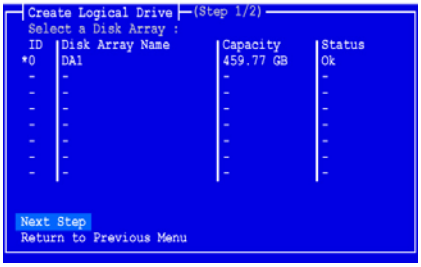


The Create Logical Drive Step 1/2 screen appears.

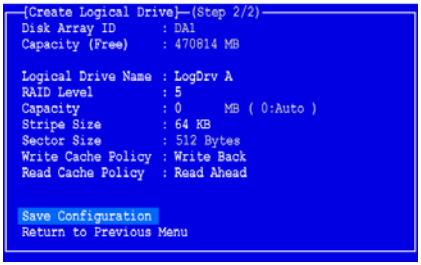
10. Press the arrow keys to highlight a disk array. Then press the spacebar to choose the disk array.

    An asterisk (*) appears at the left of the chosen disk array.

11. Highlight *Next Step* and press Enter.



The Create Logical Drive Step 2/2 screen appears.


Create Logical Drive (Step 2/2)
Disk Array ID : DA1
Capacity (Free) : 470814 MB
Logical Drive Name : LogDrv A
RAID Level : 5
Capacity : 0 MB (0:Auto)
Stripe Size : 64 KB
Sector Size : 512 Bytes
Write Cache Policy : Write Back
Read Cache Policy : Read Ahead
Save Configuration
Return to Previous Menu

12. To change the RAID Level, highlight *RAID Level* and press Enter.

    In the popup menu, highlight your choice of RAID Level and press Enter.

    The available RAID Levels depend on the number of physical drives you selected for your disk array.

13. Press the arrow keys to highlight *Logical Drive Name*. Type a name for your logical drive and press Enter.

14. To use less than the full physical drive capacity for this logical drive, highlight *Capacity* and press Enter.

    Press the Delete or Backspace keys to erase the current capacity. Type the new capacity in MB to allocate to this logical drive.

    Later, you can assign the unused capacity to a second logical drive.

15. To change the Stripe Size, highlight *Stripe Size* and press Enter.

    Highlight your choice of *64 KB*, *128 KB, 256 KB, 512 KB, or 1024 KB* and press Enter.

16. To change the Sector Size, highlight *Sector Size* and press Enter.

    Use the default 512 B. Only exceptions are logical drives larger than 2 TB on Windows XP 32-bit. See page 253 for more information.

17. To change the Write Cache Policy, highlight *Write Cache Policy* and press Enter.

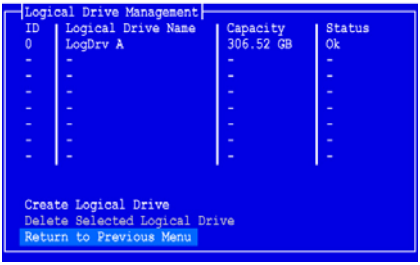
    Highlight your choice of *Write Through* or *Write Back* and press Enter.

18. To change the Read Cache Policy, highlight *Read Cache Policy* and press Enter.

    Highlight your choice of *None*, *Read Cache*, or *Read Ahead* and press Enter.

19. Highlight *Save Configuration* and press Enter.

    The Logical Drive Management screen appears with your new logical drive.



    At this point you can create additional logical drives, if there is physical drive space available. To create another logical drive, repeat steps 4 though 18 above.

20. Press the F10 key to exit the SuperBuild utility and press Y to confirm and restart the computer.

    Do not press the Ctrl-Alt-Del keys. Do not press the Esc key.

You have successfully created a new RAID logical drive.

Important

You must partition and format your new logical drive before you can use it. Use the same method of partitioning and formatting a logical drive as you would any other fixed disk added to your computer system.

Installing the CLI

The Command Line Interface (CLI) provides rapid setup of disk arrays and logical drives. You can also manage your SuperTrak system using the CLI.

Installing onto Windows

To install the CLI onto your Windows PC or server:

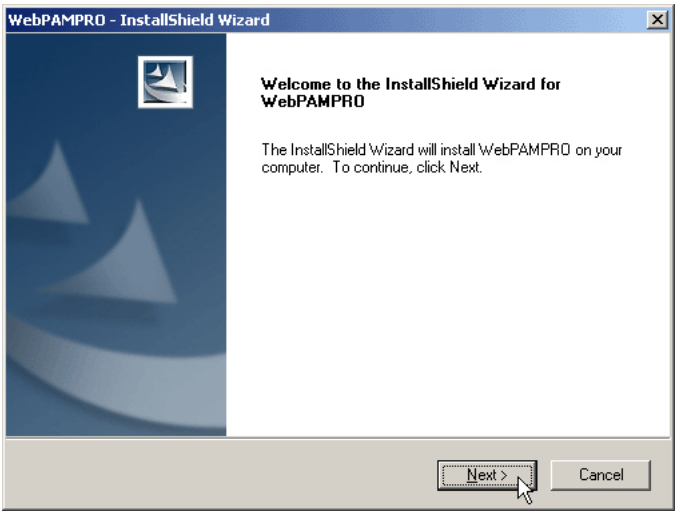
1. Boot the PC or server, launch Windows, and log in as the Administrator.

   If the computer is already running, exit all programs. If you are not logged in as the Administrator, log out, then log in again as the Administrator.
2. Insert the Software CD into your CD-ROM drive.

   The installer window opens automatically.
3. Click the **CLI/SNMP** button, then click the **Install CLI for Windows** button.

   The first CLI installation dialog box appears.
4. In the Introduction dialog box, click the **Next** button to proceed with installation.

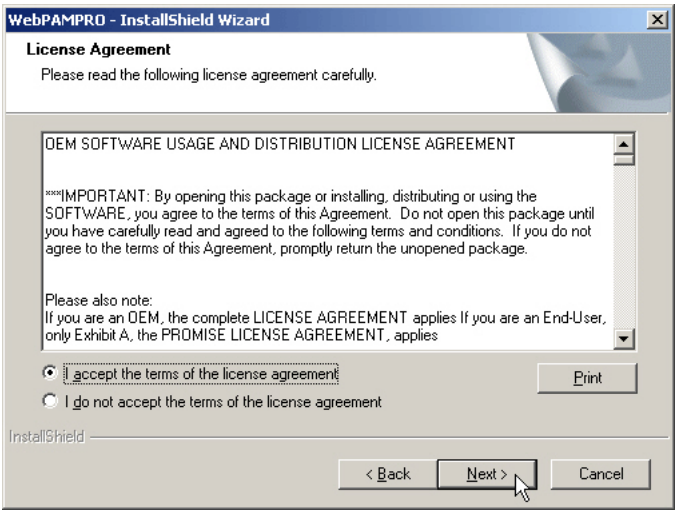
Figure 12. Introduction dialog box


WebPAMPRO - InstallShield Wizard
Welcome to the InstallShield Wizard for WebPAMPRO
The InstallShield Wizard will install WebPAMPRO on your computer. To continue, click Next.
Next >
Cancel

The CLI uses the same installer as WebPAM PRO. Even though the dialog boxes say “WebPAM PRO,” this procedure installs the CLI.

5. In the License Agreement dialog box, choose the **I accept...** option, then click the **Next** button.

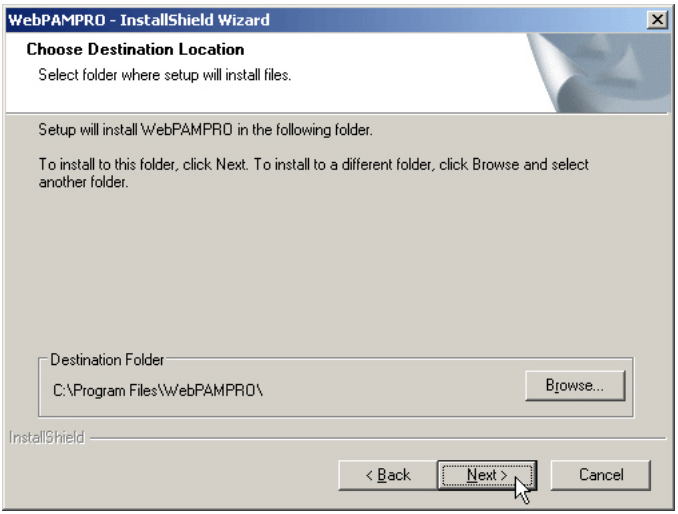
Figure 13. License Agreement dialog box


WebPAMPRO - InstallShield Wizard
License Agreement
Please read the following license agreement carefully.
OEM SOFTWARE USAGE AND DISTRIBUTION LICENSE AGREEMENT
***IMPORTANT: By opening this package or installing, distributing or using the SOFTWARE, you agree to the terms of this Agreement. Do not open this package until you have carefully read and agreed to the following terms and conditions. If you do not agree to the terms of this Agreement, promptly return the unopened package.
Please also note:
If you are an OEM, the complete LICENSE AGREEMENT applies If you are an End-User, only Exhibit A, the PROMISE LICENSE AGREEMENT, applies
I accept the terms of the license agreement
I do not accept the terms of the license agreement
Print
InstallShield
< Back
Next >
Cancel

6. In the Choose Destination Location dialog box, you can:
   - Accept the default installation folder (recommended)
   - Specify a different installation folder (advanced users)

   When you agree with the proposed installation folder, click the **Next** button.

Figure 14. Choose Destination Location dialog box

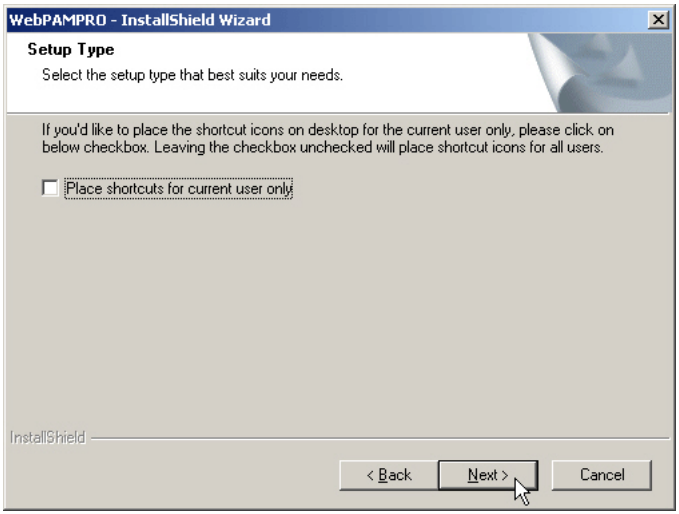

WebPAMPRO - InstallShield Wizard
Choose Destination Location
Select folder where setup will install files.
Setup will install WebPAMPRO in the following folder.
To install to this folder, click Next. To install to a different folder, click Browse and select another folder.
Destination Folder
C:\Program Files\WebPAMPRO\
Browse...
InstallShield
< Back
Next >
Cancel

7. In the Setup type dialog box, check the box if you only want to create desktop shortcut (right) for the current user.

   Leave the box unchecked to create a desktop shortcut for all users.

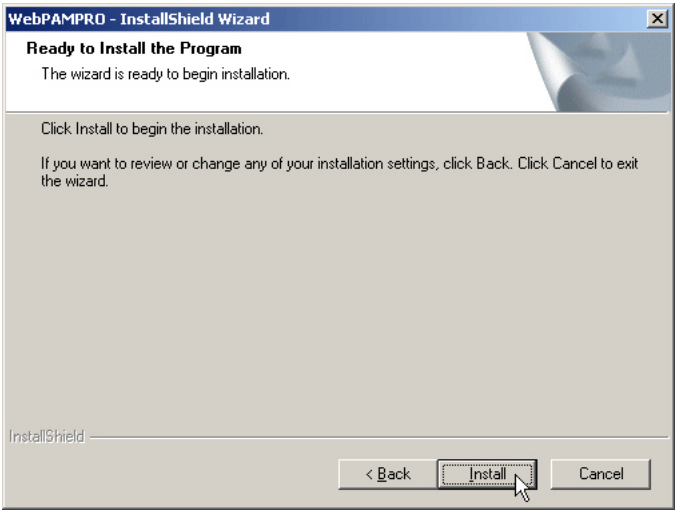
   Click the **Next** button to continue.

Figure 15. Setup Type dialog box


WebPAMPRO - InstallShield Wizard
Setup Type
Select the setup type that best suits your needs.
If you'd like to place the shortcut icons on desktop for the current user only, please click on below checkbox. Leaving the checkbox unchecked will place shortcut icons for all users.
Place shortcuts for current user only
InstallShield
< Back
Next >
Cancel

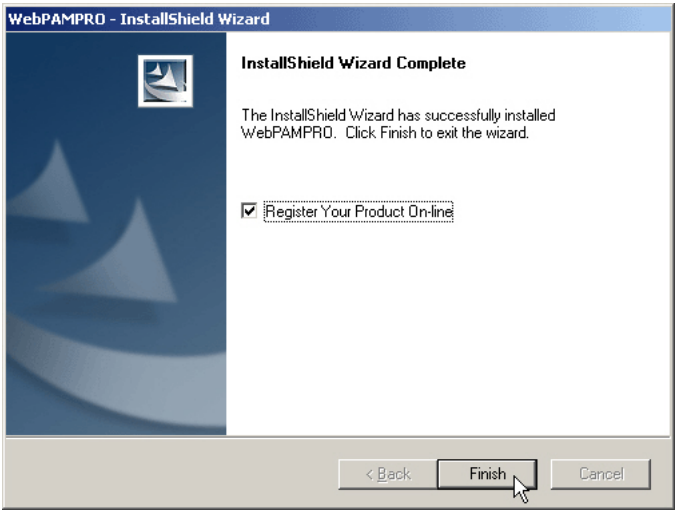
8. In the Ready to Install dialog box, click the **Install** button to continue.

Figure 16. Ready to Install dialog box


WebPAMPRO - InstallShield Wizard
Ready to Install the Program
The wizard is ready to begin installation.
Click Install to begin the installation.
If you want to review or change any of your installation settings, click Back. Click Cancel to exit the wizard.
InstallShield
< Back
Install
Cancel

9. In the Install Complete dialog box, click the **Finish** button to exit the installer.

Figure 17. Install Complete dialog box


WebPAMPRO - InstallShield Wizard
InstallShield Wizard Complete
The InstallShield Wizard has successfully installed WebPAMPRO. Click Finish to exit the wizard.
Register Your Product On-line
< Back
Finish
Cancel

With the Register Your Product Online box checked, your browser will open and go directly to the Promise product registration website. Thank you for taking the time to register.

To open the CLI, click the **CLI icon** on the desktop (right).

Go to “Chapter 6: Management with the CLI” on page 185 for information about using this application.

Installing onto Linux

Important

Check the *SuperTrak Read Me* file for any issues pertaining to the distribution and version of Linux OS running on your PC or server.

For Linux PCs, Promise offers two different binary files:

- **WebPAM PRO and CLI** – Installs either or both WebPAM PRO and the CLI
- **CLI only** – Installs only the CLI

Note that both of these binary files open in a terminal window and both files use the WebPAM PRO installer. The procedure below installs the CLI only. To install WebPAM PRO, see page 49.

To install the CLI onto your Linux PC or server:

1. Boot the PC or server, log in as **root**, and launch the Linux GUI.

   If the computer is already running, exit all programs. If you are not logged in as **root**, log out, then log in again as **root**.
2. Insert the Software CD into your CD-ROM drive.
3. Copy the **CLI_Installer...linux.bin** file from the Software CD **\CLI\Linux** directory to the **/root** directory on your PC.
4. Open a terminal window and type **sh** followed by one space, the exact name of the **CLI_Installer...linux.bin** file, then press Enter.

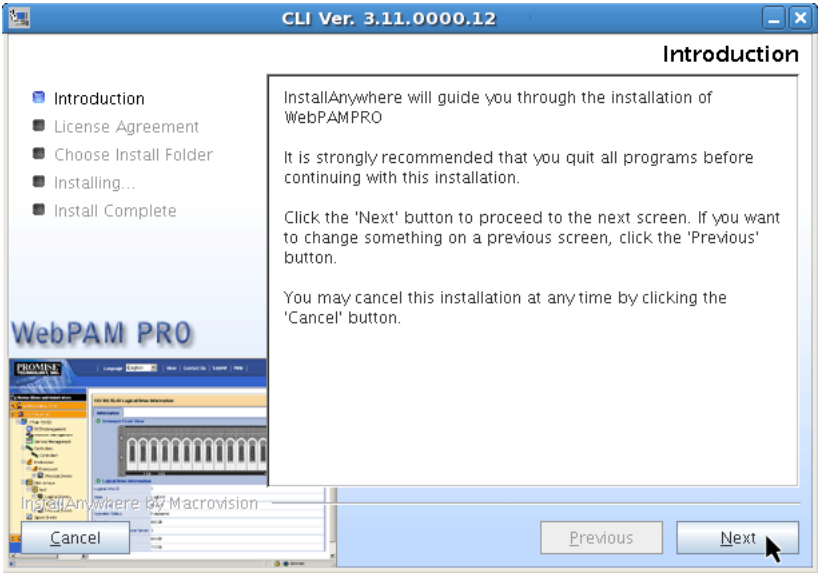
Note

For silent installation, type **sh** followed by the exact name of the **CLI_Installer...linux.bin** file, followed by **-i silent**, then press Enter.

After several moments, the first installation dialog box appears.

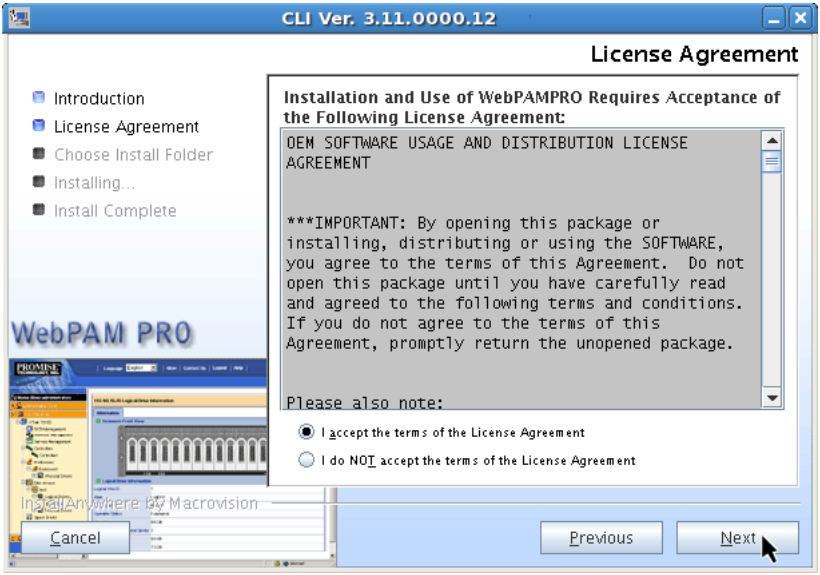
5. In the Introduction dialog box, click the **Next** button to proceed with installation.

Figure 18. Introduction dialog box


CLI Ver. 3.11.0000.12
Introduction
Introduction
License Agreement
Choose Install Folder
Installing...
Install Complete
InstallAnywhere will guide you through the installation of WebPAMPRO
It is strongly recommended that you quit all programs before continuing with this installation.
Click the 'Next' button to proceed to the next screen. If you want to change something on a previous screen, click the 'Previous' button.
You may cancel this installation at any time by clicking the 'Cancel' button.
WebPAM PRO
InstallAnywhere by Macrovision
Cancel
Previous
Next

6. In the License Agreement dialog box, choose the **I accept...** option, then click the **Next** button.

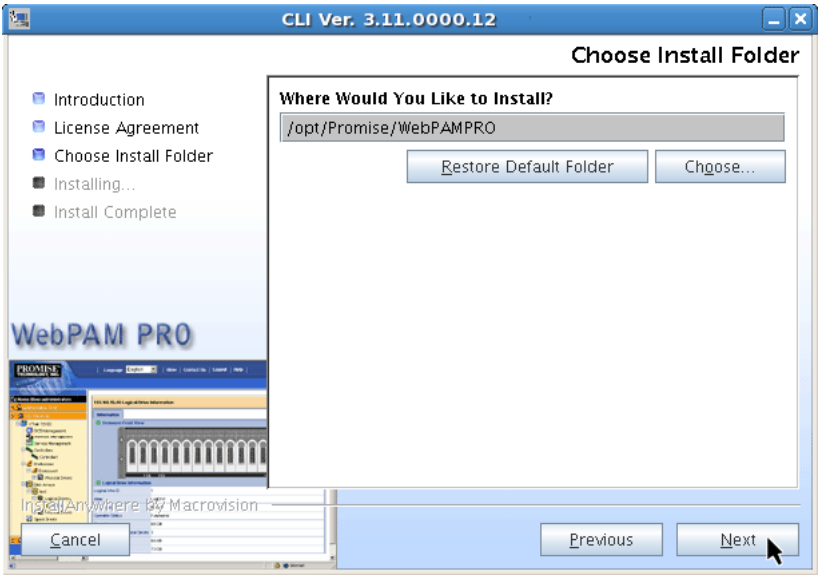
Figure 19. License Agreement dialog box


CLI Ver. 3.11.0000.12
License Agreement
Introduction
License Agreement
Choose Install Folder
Installing...
Install Complete
WebPAM PRO
Installation and Use of WebPAMPRO Requires Acceptance of the Following License Agreement:
OEM SOFTWARE USAGE AND DISTRIBUTION LICENSE AGREEMENT
***IMPORTANT: By opening this package or installing, distributing or using the SOFTWARE, you agree to the terms of this Agreement. Do not open this package until you have carefully read and agreed to the following terms and conditions. If you do not agree to the terms of this Agreement, promptly return the unopened package.
Please also note:
I accept the terms of the License Agreement
I do NOT accept the terms of the License Agreement
InstallAnywhere by Macrovision
Cancel
Previous
Next

7. When the Choose Install Folder dialog box appears, you can:
   - Accept the default installation folder (recommended)
   - Specify a different installation folder (advanced users)

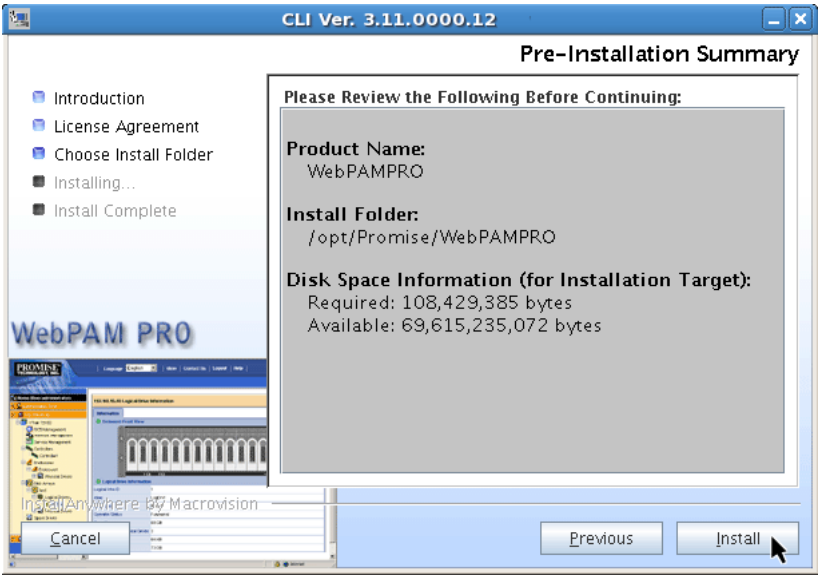
   When you agree with the proposed installation folder, click the **Next** button.

Figure 20. Choose Install Folder dialog box



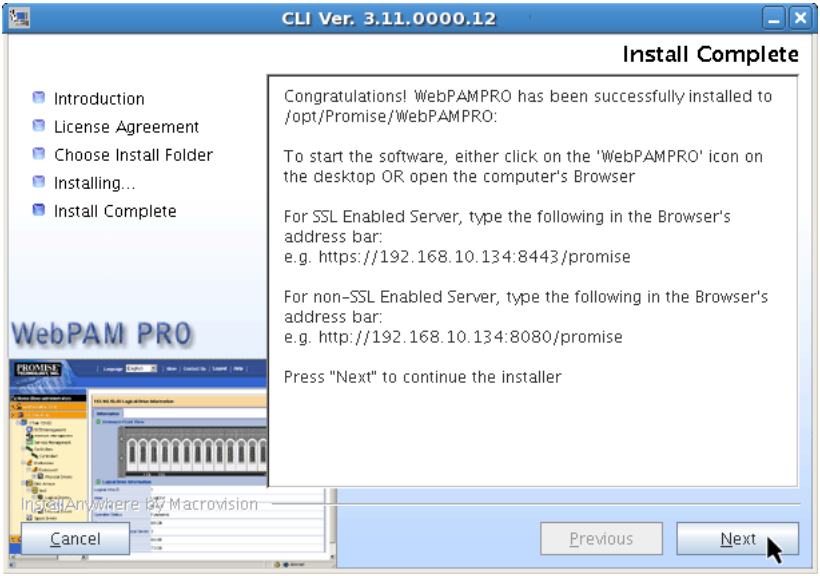
8. In the Pre-Installation Summary dialog box, click the **Install** button to continue.

Figure 21. Pre-Installation Summary dialog box



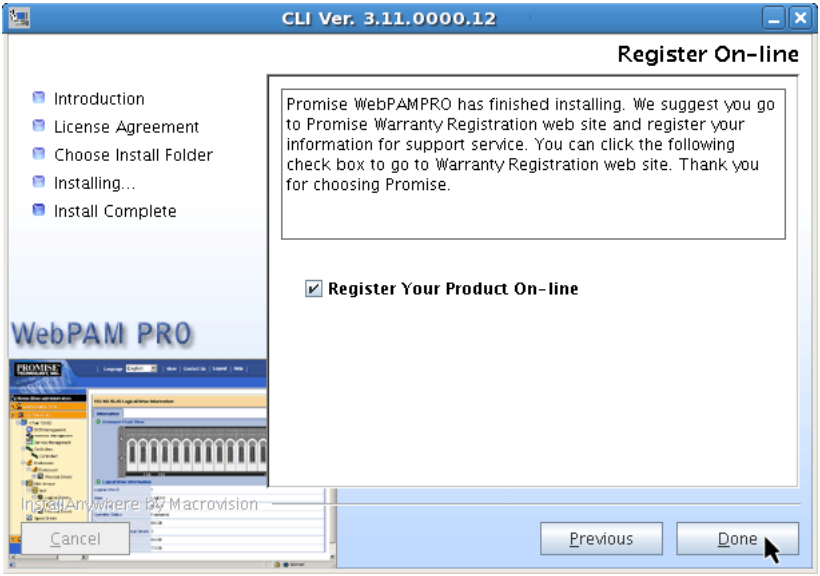
9. In the Install Complete dialog box, click the **Next** button to continue.

Figure 22. Install Compete dialog box


CLI Ver. 3.11.0000.12
Install Complete
Introduction
License Agreement
Choose Install Folder
Installing...
Install Complete
WebPAM PRO
Congratulations! WebPAMPRO has been successfully installed to /opt/Promise/WebPAMPRO:
To start the software, either click on the 'WebPAMPRO' icon on the desktop OR open the computer's Browser
For SSL Enabled Server, type the following in the Browser's address bar:
e.g. https://192.168.10.134:8443/promise
For non-SSL Enabled Server, type the following in the Browser's address bar:
e.g. http://192.168.10.134:8080/promise
Press "Next" to continue the installer
InstallAnywhere by Macrovision
Cancel
Previous
Next

10. In the Register On-line dialog box, click the **Done** button to exit the installer

Figure 23. Register On-line dialog box


CLI Ver. 3.11.0000.12
Register On-line
Introduction
License Agreement
Choose Install Folder
Installing...
Install Complete
Promise WebPAMPRO has finished installing. We suggest you go to Promise Warranty Registration web site and register your information for support service. You can click the following check box to go to Warranty Registration web site. Thank you for choosing Promise.
Register Your Product On-line
WebPAM PRO
InstallAnywhere by Macrovision
Cancel
Previous
Done

With the Register Your Product On-line box checked, your browser will open and go directly to the Promise product registration website. Thank you for taking the time to register.

Go to the **/opt/Promise/WebPAMPRO/Agent/bin** directory and type **./cliib** to start the CLI.

Go to “Chapter 6: Management with the CLI” on page 185 for information about using this application.

Installing the CLI onto FreeBSD

PCs running FreeBSD do not support WebPAM PRO, therefore they cannot use the WebPAM PRO installer. Those systems use a binary file to install the CLI in a terminal window.

Choose the x64 binary file for a 64-bit OS or the x86 binary file for a 32-bit OS.

To install the CLI onto your FreeBSD PC or server:

1. Boot the PC or server, log in as **root**.

   If the computer is already running, exit all programs. If you are not logged in as **root**, log out, then log in again as **root**.
2. Insert the Software CD into your CD-ROM drive.
3. Copy the **CLI_Installer...FreeBSD.bin** file from the Software CD **\CLI\FreeBSD** directory to the **/root** directory on your PC.
4. Open a terminal window and type

   sh CLI_Installer...FreeBSD.bin -i silent

   and press Enter.

   CLI_Installer...FreeBSD.bin represents the exact name of the CLI binary file, such as
   CLI_Installer_3_11_0000_00_x64FreeBSD.bin, or
   CLI_Installer_3_11_0000_00_x86FreeBSD.bin
5. Reboot the PC or server.

After the installation is finished, type **cliib** with any shell to start the CLI.

Go to “Chapter 6: Management with the CLI” on page 185 for information about using this application.

Installing the CLI onto VMware

The VMware virtualization platform does not support WebPAM PRO, therefore they cannot use the WebPAM PRO installer. Those systems use a binary file to install the CLI in a terminal window.

Before you begin, download the **CLI_Installer...VMware.bin** file from the Promise Support Website to your PC or server.

To install the CLI onto your VMware platform:

1. Boot the PC or server, log in as **root**.

   If the computer is already running, exit all programs. If you are not logged in as **root**, log out, then log in again as **root**.
2. Copy the **CLI_Installer...VMware.bin** file to the **/root** directory on your PC.
3. Open a terminal window and type

   sh CLI_Installer...VMware.bin -i silent

   and press Enter.

   CLI_Installer...VMware.bin represents the exact name of the CLI binary file, such as CLI_Installer_3_11_0000_00_VMware.bin

After the installation is finished, go to the **/opt/Promise/WebPAMPRO/Agent/bin** directory and type **./cliib** to start the CLI.

Go to “Chapter 6: Management with the CLI” on page 185 for information about using this application.

Installing WebPAM PRO

Web-Based Promise Array Management—Professional (WebPAM PRO) software provides a browser-based graphic user interface used to monitor and manage Promise RAID products and their logical drives. Because it works over your network, it can monitor and control multiple systems.

WebPAM PRO involves four components:

- **Utility Server** – Enables RAID management over a network
- **Agent** – Enables the Host PC to communicate with the Utility Server
- **Java Runtime Environment (JRE)** – A private installation for WebPAM PRO
- **Internet Browser** – Comes with your OS

When you install WebPAM PRO on a PC or server, you are installing the Utility Server, Agent, and JRE.

- Utility Server (page 38)
- Agent (page 38)
- JRE (page 39)
- Internet Browser (page 39)
- Installing WebPAM PRO onto Windows (page 40)
- Installing WebPAM PRO onto Linux (page 49)

Utility Server

The Utility Server can run on the Host PC (where the SuperTrak card is installed), or on a networked PC, if your WebPAM PRO system includes remote management over a network. You run the Utility Server by directing your browser to the IP address of the Host PC.

Agent

The Agent runs on the Host PC (where the SuperTrak card is installed). After you have logged into the Utility Server through WebPAM PRO, the Utility Server accesses the Agent on the Host PC. As the user, you do not access the Agent directly.

Operating System Support

On the Host PC where you install the SuperTrak controller and WebPAM PRO, Promise Technology recommends:

- Windows Server 2008 (64 bit) with or without Hyper-V
- Windows Server 2008 (32 bit)
- Windows Vista (32 or 64 bit)

- Windows Server 2003 SP1, SP2; R2 (32 or 64 bit)
- Windows XP Professional SP2, SP3 (32 or 64 bit)
- Red Hat Enterprise Linux 4.4, 4.5, 4.6, 4.7, 5.0, 5.1, 5.2 (32 or 64 bit)
- openSUSE 10.2, 10.3, 11 (32 or 64 bit)
- SLES 10, 10 SP1, 10 SP2 (32 or 64 bit)
- Miracle Linux 4 SP2, 5 (32 or 64 bit)
- Fedora Core 6, 7, 8, 9 (32 or 64 bit)
- Open Source Driver for Linux 2.6 kernel (32 or 64 bit)

Choose one of these operating systems to take full advantage of all the features of WebPAM PRO.

JRE

The WebPAM PRO installation program installs a private Java Runtime Environment (JRE) under the same directory where WebPAM PRO is installed. WebPAM PRO uses this private JRE to avoid incompatibility issues with any other JREs that may be present on your system.

Internet Browser

Typically an Internet browser comes with your operating system. The WebPAM PRO installer does not include a browser. For computers that will remotely monitor and manage the RAID, the browser is the only software required.

Browser Support

Choose the latest version of the following browsers to use with WebPAM PRO:

- Internet Explorer
- Firefox
- Netscape Navigator

If you do not have one of the above browsers on the Host PC, install the browser first and make it the default browser. Then install WebPAM PRO.

Important

Install the SuperTrak driver for your operating system before installing WebPAM PRO. See “Chapter 3: Installing Drivers” on page 63 for instructions.

Caution

If you have WebPAM or an earlier version of WebPAM PRO on your PC or server, manually uninstall them before you install WebPAM PRO from the Software CD.

Go to one of the following procedures:

- “Installing WebPAM PRO onto Windows” on page 40.
- “Installing WebPAM PRO onto Linux” on page 49.

Installing WebPAM PRO onto Windows

To install WebPAM PRO onto your Windows-based PC or server:

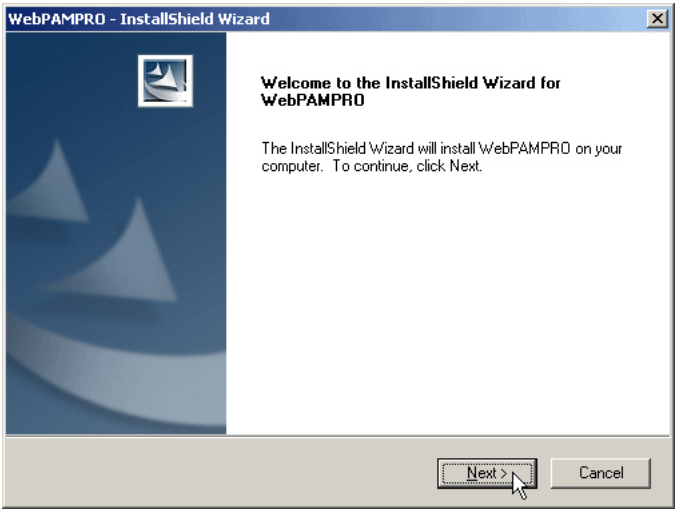
1. Boot the PC or server, launch Windows, and log in as the Administrator.

   If the computer is already running, exit all programs. If you are not logged in as the Administrator, log out, then log in again as the Administrator.
2. Insert the Software CD into your CD-ROM drive.

   The installer window opens automatically.
3. Click the **WebPAM PRO Software** button, then click the **Install WebPAM PRO for Windows** button.

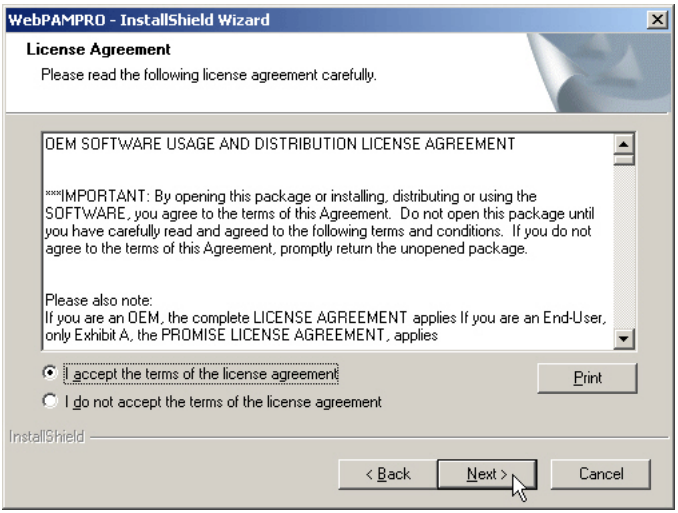
   The first WebPAM PRO installation dialog box appears.
4. In the Introduction dialog box, click the **Next** button to proceed with installation.

Figure 24. Introduction dialog box


WebPAMPRO - InstallShield Wizard
Welcome to the InstallShield Wizard for WebPAMPRO
The InstallShield Wizard will install WebPAMPRO on your computer. To continue, click Next.
Next >
Cancel

5. In the License Agreement dialog box, choose the **I accept...** option, then click the **Next** button.

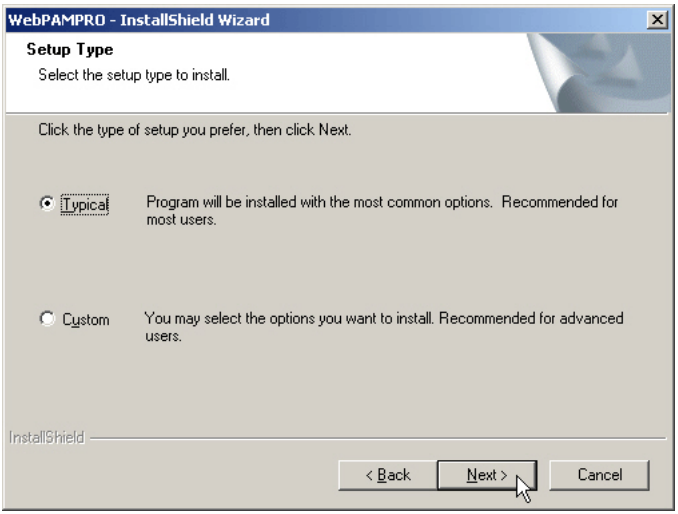
Figure 25. License Agreement dialog box


WebPAMPRO - InstallShield Wizard
License Agreement
Please read the following license agreement carefully.
OEM SOFTWARE USAGE AND DISTRIBUTION LICENSE AGREEMENT
***IMPORTANT: By opening this package or installing, distributing or using the SOFTWARE, you agree to the terms of this Agreement. Do not open this package until you have carefully read and agreed to the following terms and conditions. If you do not agree to the terms of this Agreement, promptly return the unopened package.
Please also note:
If you are an OEM, the complete LICENSE AGREEMENT applies If you are an End-User, only Exhibit A, the PROMISE LICENSE AGREEMENT, applies
I accept the terms of the license agreement
I do not accept the terms of the license agreement
Print
InstallShield
< Back
Next >
Cancel

6. In the Setup Type dialog box, choose the option you prefer:
   - **Typical** – Installs the Agent, Server, and CLI. Recommended for most users.
   - **Custom** – Enables you to choose which components to install. Optional for advanced users.

   Click the **Next** button to continue.

Figure 26. Setup Type dialog box

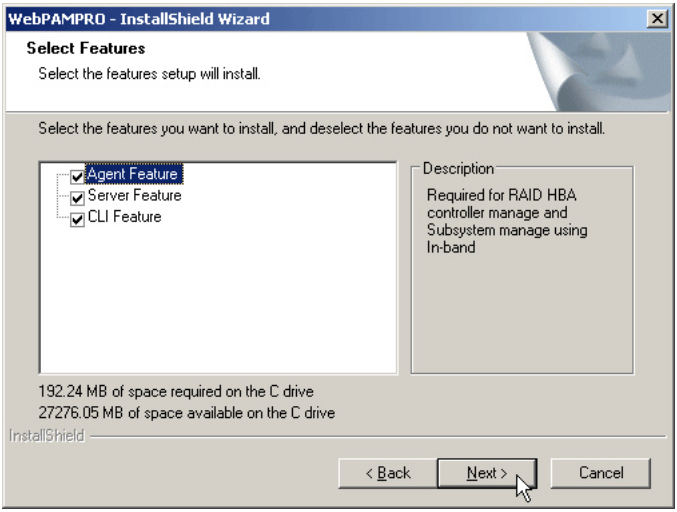

WebPAMPRO - InstallShield Wizard
Setup Type
Select the setup type to install.
Click the type of setup you prefer, then click Next.
Typical
Program will be installed with the most common options. Recommended for most users.
Custom
You may select the options you want to install. Recommended for advanced users.
InstallShield
< Back
Next >
Cancel

7. Optional. If you chose the Custom option, the Select Features dialog box appears. Choose any combination of three options:
   - **Agent Feature** – The Agent is required on the Host PC (where the SuperTrak card is installed) and for In-band management of subsystems.
   - **Server Feature** – The Utility Server is required for local or remote management. If you have a network, install the Server on one of your networked PCs. If you have only local management, install the Server on the Host PC (where the SuperTrak card is installed).
   - **CLI Feature** – The Command Line Interface runs on the Host PC (where the SuperTrak card is installed) and provides local management only.

   Checked items will be installed. Uncheck items you do *not* want to install.

   Click the **Next** button to continue.

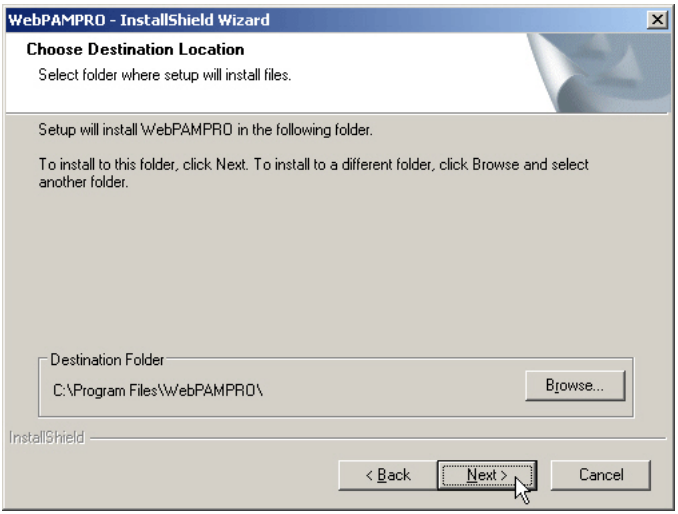
Figure 27. Custom Setup dialog box


WebPAMPRO - InstallShield Wizard
Select Features
Select the features setup will install.
Select the features you want to install, and deselect the features you do not want to install.
Agent Feature
Server Feature
CLI Feature
Description
Required for RAID HBA controller manage and Subsystem manage using In-band
192.24 MB of space required on the C drive
27276.05 MB of space available on the C drive
InstallShield
< Back
Next >
Cancel

8. In the Choose Destination Location dialog box, you can:
   - Accept the default installation folder. Recommended for most users.
   - Specify a different installation folder. Optional for advanced users.

   When you agree with the proposed installation folder, click the **Next** button.

Figure 28. Choose Destination Location dialog box


WebPAMPRO - InstallShield Wizard
Choose Destination Location
Select folder where setup will install files.
Setup will install WebPAMPRO in the following folder.
To install to this folder, click Next. To install to a different folder, click Browse and select another folder.
Destination Folder
C:\Program Files\WebPAMPRO\
Browse...
InstallShield
< Back
Next >
Cancel

9. In the WebPAM PRO Server dialog box, check the box to select SSL security.

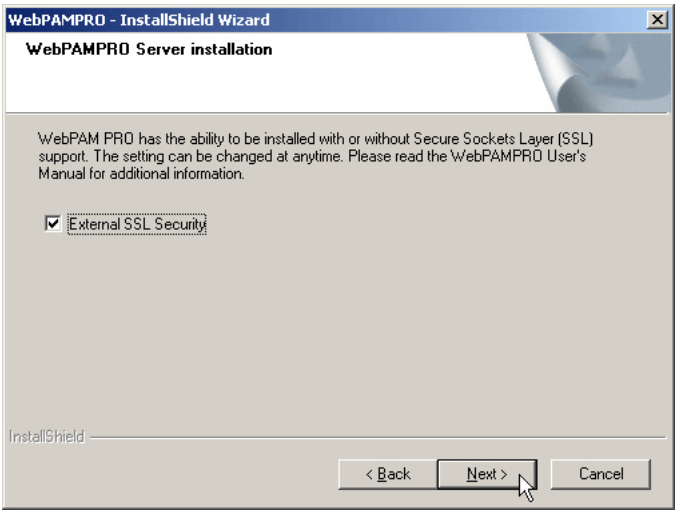
   External SSL Security – Applies security to all connections involving the Internet or outside your company firewall.

   Security options are invisible to authorized users.

   Promise Technology provides a default certificate for the server as well as for internal data communication. However, in some cases it is better to install and verify your own certificate for the webserver. And, if possible, verify the certificate by a certificate authority such as Verisign or Thwate. See your MIS Administrator for guidance.

   Click the **Next** button to continue.

Figure 29. WebPAM PRO Server dialog box


WebPAMPRO - InstallShield Wizard
WebPAMPRO Server installation
WebPAM PRO has the ability to be installed with or without Secure Sockets Layer (SSL) support. The setting can be changed at anytime. Please read the WebPAMPRO User's Manual for additional information.
External SSL Security
InstallShield
< Back
Next >
Cancel

Note

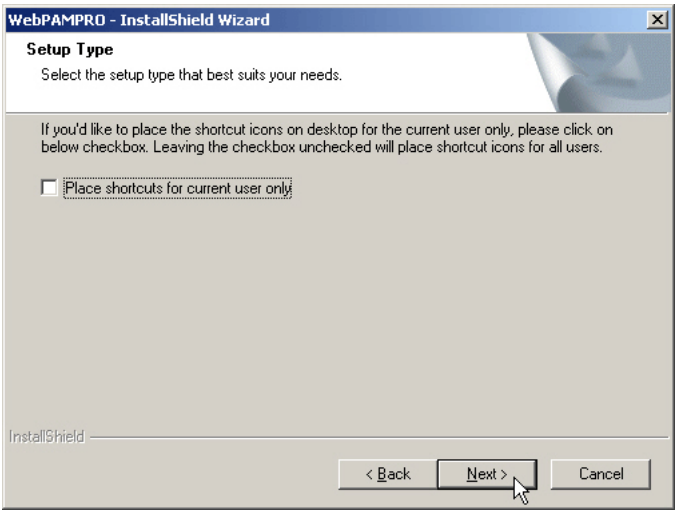
If you are only installing the CLI, this dialog box does not appear.

10. In the Setup type dialog box, check the box if you only want to create desktop shortcut (right) for the current user.

    Leave the box unchecked to create a desktop shortcut for all users.

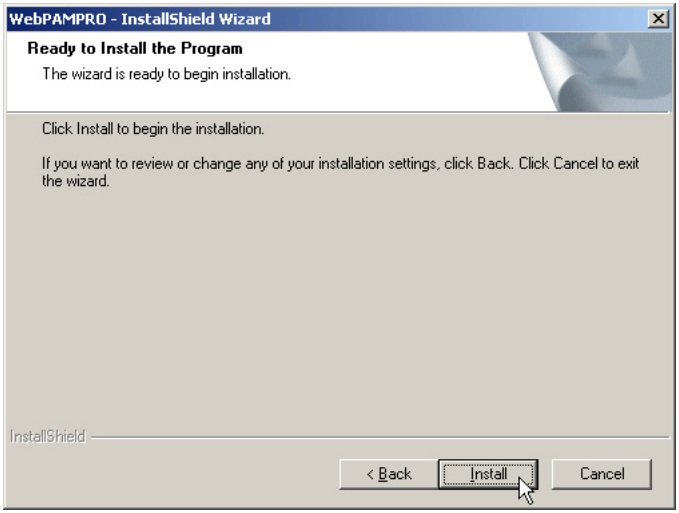
    Click the **Next** button to continue.

Figure 30. Setup Type dialog box


WebPAMPRO - InstallShield Wizard
Setup Type
Select the setup type that best suits your needs.
If you'd like to place the shortcut icons on desktop for the current user only, please click on below checkbox. Leaving the checkbox unchecked will place shortcut icons for all users.
Place shortcuts for current user only
InstallShield
< Back
Next >
Cancel

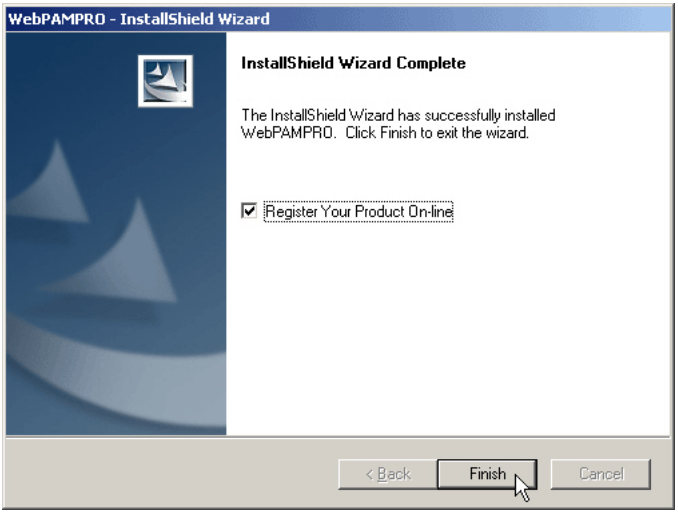
11. In the Ready to Install dialog box, click the **Install** button to continue.

Figure 31. Ready to Install dialog box


WebPAMPRO - InstallShield Wizard
Ready to Install the Program
The wizard is ready to begin installation.
Click Install to begin the installation.
If you want to review or change any of your installation settings, click Back. Click Cancel to exit the wizard.
InstallShield
< Back
Install
Cancel

12. In the Install Complete dialog box, click the **Finish** button to exit the installer.

Figure 32. Install Complete dialog box


WebPAMPRO - InstallShield Wizard
InstallShield Wizard Complete
The InstallShield Wizard has successfully installed WebPAMPRO. Click Finish to exit the wizard.
Register Your Product On-line
< Back
Finish
Cancel

With the Register Your Product Online box checked, your browser will open and go directly to the Promise product registration website. Thank you for taking the time to register.

This completes the WebPAM PRO installation for Windows. Go to “Logging into WebPAM PRO” on page 58.

Installing WebPAM PRO onto Linux

Important

Check the *SuperTrak Read Me* file for any issues pertaining to the distribution and version of Linux OS that you are running.

To install WebPAM PRO onto your Linux-based PC or server:

1. Boot the PC or server, log in as **root**, and launch the Linux GUI.

   If the computer is already running, exit all programs. If you are not logged in as **root**, log out, then log in again as **root**.
2. Insert the Software CD into your CD-ROM drive.
3. Go to the WebPAM PRO / Linux directory on the CD-ROM and copy the **WebPAMPRO...Linux.bin** file to the root directory.
4. Open a terminal window and type **sh** followed by the exact name of the **WebPAMPRO...Linux.bin** file, then press Enter.

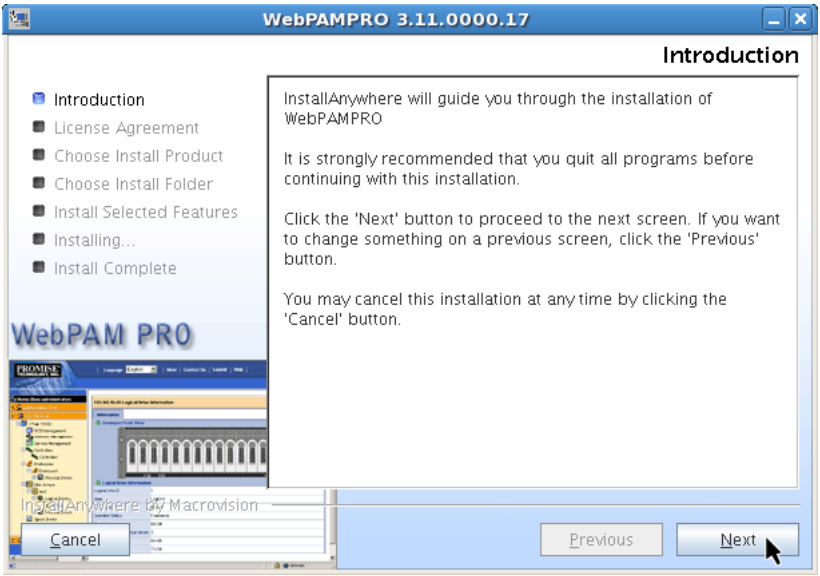
Note

For silent installation, type **sh** followed by the exact name of the **WebPAMPRO...linux.bin** file, followed by **-i silent**, then press Enter.

After several moments, the first WebPAM PRO installation dialog box appears.

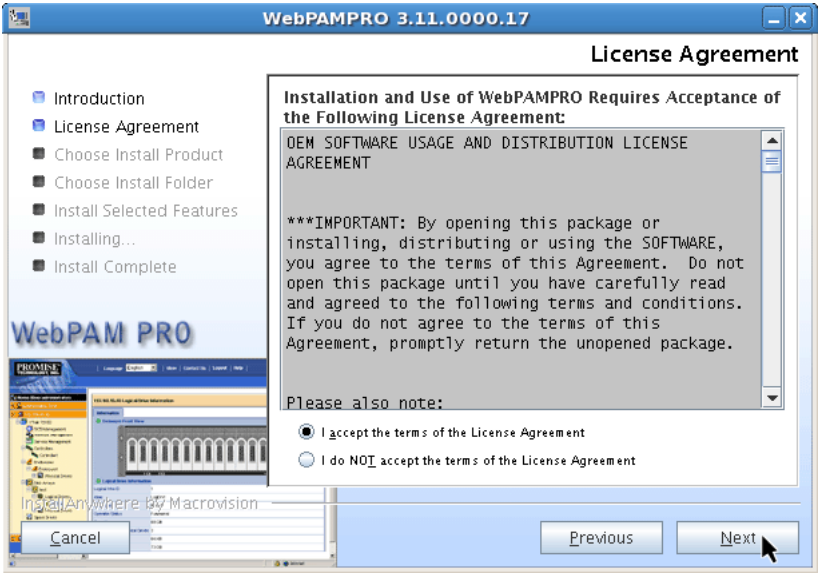
5. In the Introduction dialog box, click the **Next** button to proceed with installation.

Figure 33. Introduction dialog box


WebPAMPRO 3.11.0000.17
Introduction
Introduction
License Agreement
Choose Install Product
Choose Install Folder
Install Selected Features
Installing...
Install Complete
WebPAM PRO
InstallAnywhere will guide you through the installation of WebPAMPRO
It is strongly recommended that you quit all programs before continuing with this installation.
Click the 'Next' button to proceed to the next screen. If you want to change something on a previous screen, click the 'Previous' button.
You may cancel this installation at any time by clicking the 'Cancel' button.
InstallAnywhere by Macrovision
Cancel
Previous
Next

6. In the License Agreement dialog box, choose the **I accept...** option, then click the **Next** button.

Figure 34. License Agreement dialog box

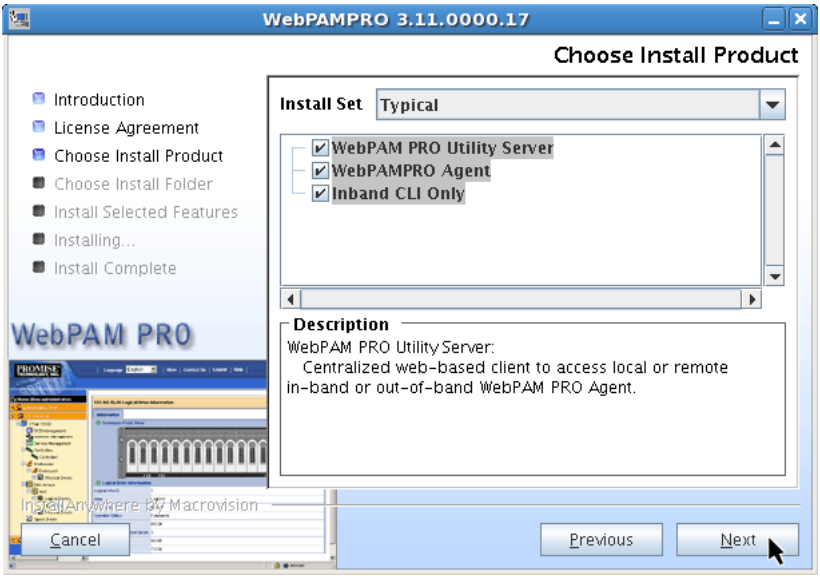

WebPAMPRO 3.11.0000.17
License Agreement
Introduction
License Agreement
Choose Install Product
Choose Install Folder
Install Selected Features
Installing...
Install Complete
WebPAM PRO
Installation and Use of WebPAMPRO Requires Acceptance of the Following License Agreement:
OEM SOFTWARE USAGE AND DISTRIBUTION LICENSE AGREEMENT
***IMPORTANT: By opening this package or installing, distributing or using the SOFTWARE, you agree to the terms of this Agreement. Do not open this package until you have carefully read and agreed to the following terms and conditions. If you do not agree to the terms of this Agreement, promptly return the unopened package.
Please also note:
I accept the terms of the License Agreement
I do NOT accept the terms of the License Agreement
InstallAnywhere by Macrovision
Cancel
Previous
Next

7. In the Choose Install Product dialog box, choose any combination of three options:
   - **WebPAM PRO Utility Server** – One Server must be installed on the network, or on the Host PC if there is only local management
   - **WebPAM PRO Agent** – The Agent must be installed on every PC or Server where a SuperTrak Controller card has been installed
   - **Inband CLI Only** – Installs the Command Line Interface (CLI) You can install the CLI now or at a later time.

   Checked items will be installed. Uncheck items you do *not* want to install.

   Click the **Next** button to continue.

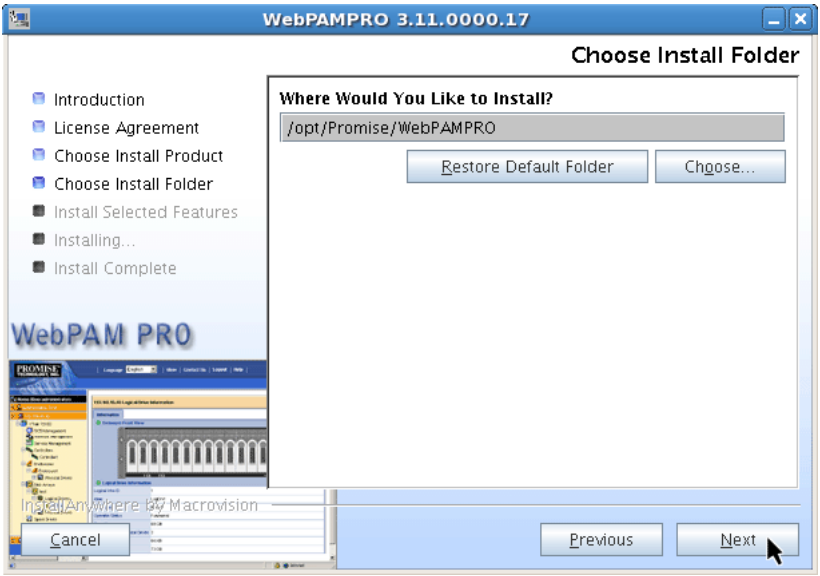
Figure 35. Choose Install Product dialog box



8. When the Choose Install Folder dialog box appears, you can:
   - Accept the default installation folder. Recommended for most users.
   - Specify a different installation folder. Optional for advanced users.

   When you agree with the proposed installation folder, click the **Next** button.

Figure 36. Choose Install Folder dialog box



9. In the SSL Security Options dialog box, check the box to select SSL security.

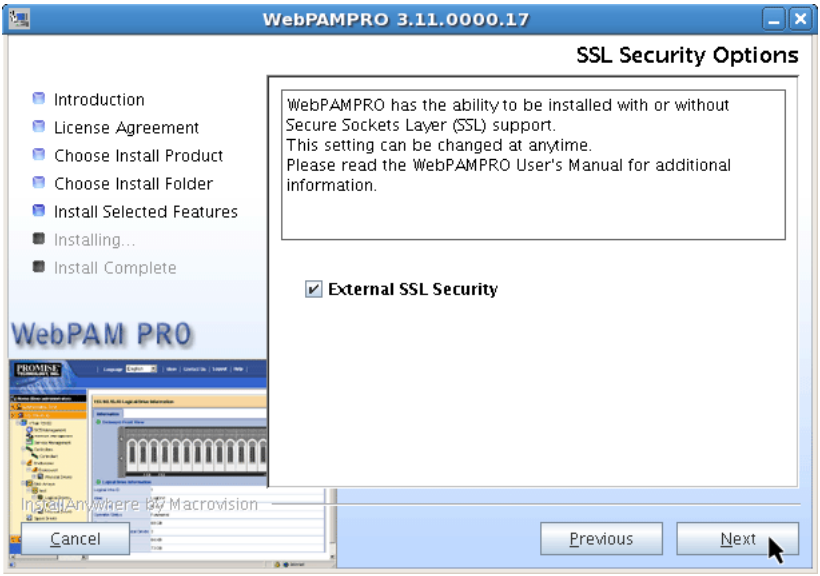
   External SSL Security – Applies security to all connections involving the Internet or outside your company firewall.

   Security options are invisible to authorized users.

   Promise Technology provides a default certificate for the server as well as for internal data communication. However, in some cases it is better to install and verify your own certificate for the webserver. And, if possible, verify the certificate by a certificate authority such as Verisign or Thwate. See your MIS Administrator for guidance.

   Click the **Next** button to continue.

Figure 37. SSL Security Options dialog box



Note

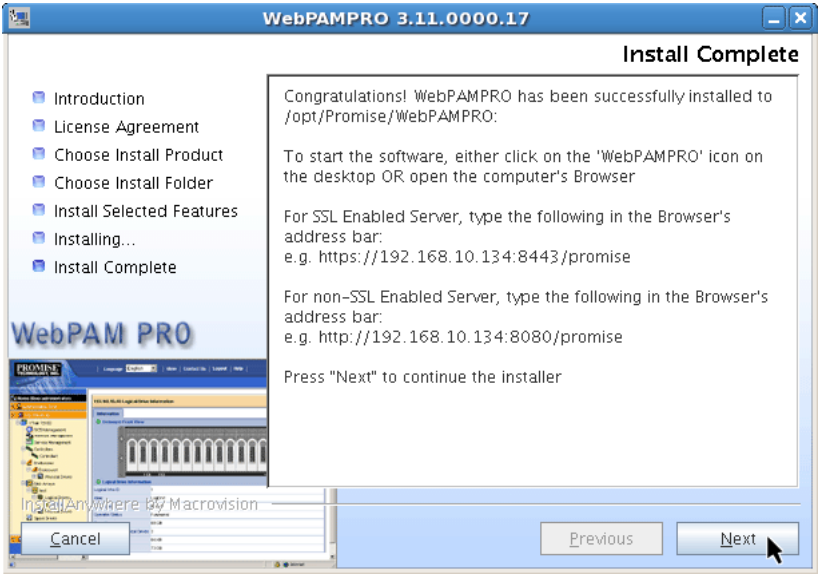
If you are only installing the CLI, this dialog box does not appear.

10. In the Pre-Installation Summary dialog box, click the **Install** button to continue.

Figure 38. Pre-Installation Summary dialog box

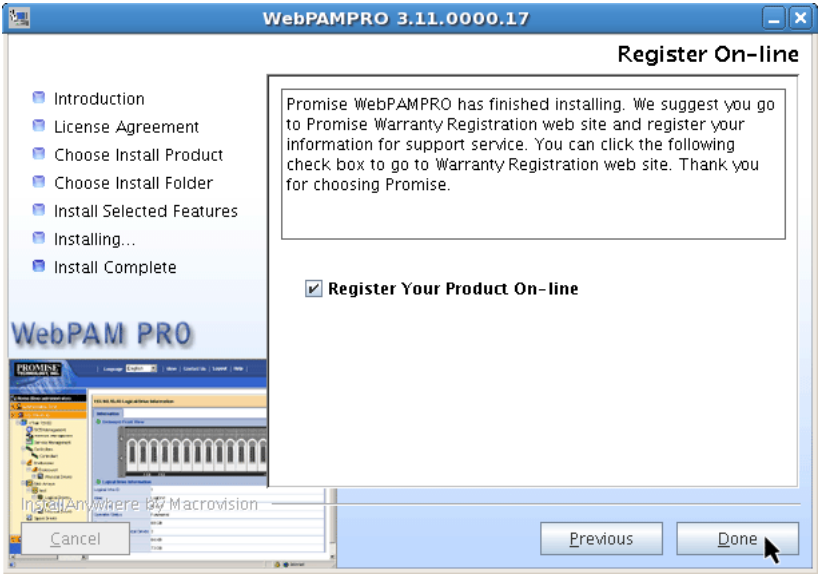
11. In the Install Complete dialog box, click the **Next** button to continue.

Figure 39. Install Compete dialog box


WebPAMPRO 3.11.0000.17
Install Complete
Introduction
License Agreement
Choose Install Product
Choose Install Folder
Install Selected Features
Installing...
Install Complete
WebPAM PRO
Congratulations! WebPAMPRO has been successfully installed to /opt/Promise/WebPAMPRO:
To start the software, either click on the 'WebPAMPRO' icon on the desktop OR open the computer's Browser
For SSL Enabled Server, type the following in the Browser's address bar:
e.g. https://192.168.10.134:8443/promise
For non-SSL Enabled Server, type the following in the Browser's address bar:
e.g. http://192.168.10.134:8080/promise
Press "Next" to continue the installer
InstallAnywhere by Macrovision
Cancel
Previous
Next

12. In the Register On-line dialog box, click the **Done** button to exit the installer

Figure 40. Register On-line dialog box


WebPAMPRO 3.11.0000.17
Register On-line
Introduction
License Agreement
Choose Install Product
Choose Install Folder
Install Selected Features
Installing...
Install Complete
Promise WebPAMPRO has finished installing. We suggest you go to Promise Warranty Registration web site and register your information for support service. You can click the following check box to go to Warranty Registration web site. Thank you for choosing Promise.
Register Your Product On-line
WebPAM PRO
InstallAnywhere by Macrovision
Cancel
Previous
Done

With the Register Your Product On-line box checked, your browser will open and go directly to the Promise product registration website. Thank you for taking the time to register.

Note

The first time you install WebPAM PRO on a RedHat Linux system, the WebPAM PRO icon appears on the desktop but not in the application menu. Please log out, then log in again, and the WebPAM PRO icon will thereafter appear in the application menu.

This completes the WebPAM PRO installation for Linux. Go to “Logging into WebPAM PRO” on page 58.

Logging into WebPAM PRO

You can log into WebPAM PRO in either of two ways:

- Logging in at the Host PC (page 58)
- Logging in over the Network (page 58)

Logging in at the Host PC

At the Host PC (where the SuperTrak EX Controller is installed), do one of the following actions:

- Double-click the WebPAM PRO desktop icon.
- Choose *WebPAM PRO* in the Windows Programs menu.
- Choose *WebPAM PRO* in the Linux Applications menu.
- Follow the steps under “Logging in over the Network”.

Logging in over the Network

You can log into WebPAM PRO from any PC with a network connection to the Host PC (where the SuperTrak EX Controller is installed).

1. Launch your Browser.
2. In the Browser address field, type the information provided below, then press Enter.

   If you selected External SSL Security during installation (Windows, see page 45; Linux, see page 54), use the *Secure Connection*. Otherwise, use the *Regular Connection*.

Regular Connection

- WebPAM PRO uses an HTTP connection. . . . . .http://
- Enter the Host PC’s IP address 192.168.10.228
- Enter the Port number . . . . . :8080
- Add promise to launch WebPAM PRO . . . . . /promise

Together, your entry looks like this:

http://192.168.10.228:8080/promise

Secure Connection

- WebPAM PRO uses a secure HTTP connection . . . . . .https://
- Enter the Host PC’s IP address 192.168.10.228
- Enter the Port number . . . . . :8443
- Add promise to launch WebPAM PRO . . . . . /promise

Together, your entry looks like this:

https://192.168.10.228:8443/promise

Notes

- You can enter the Host PC's network name in place of the IP address.
- If you are logging in at the Host PC, you can enter **localhost** in place of the IP address.
- Whether you select a regular or a secure connection, your WebPAM PRO user name and password are always secure.

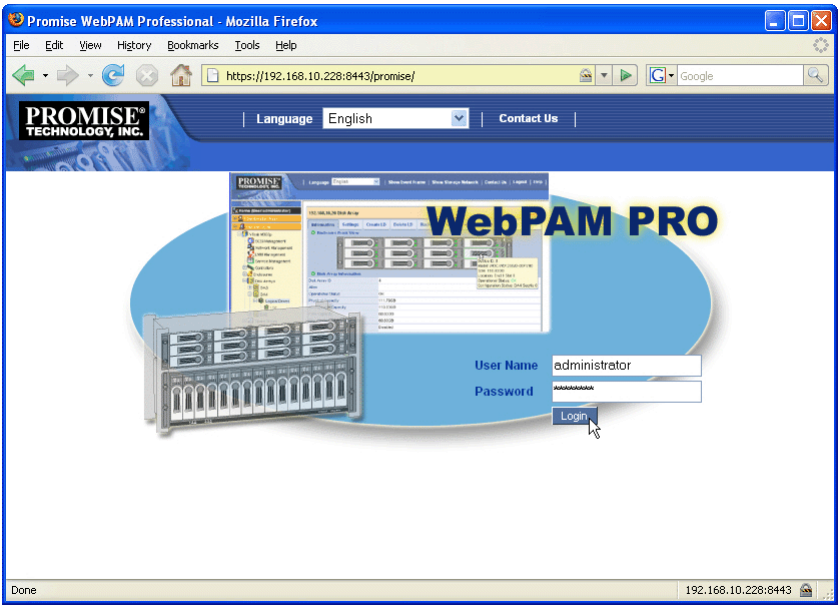
Login Screen

When the opening screen appears:

1. Type **administrator** in the User Name field.
2. Type **password** in the Password field.
3. Click the **Login** button.

   The User Name and Password are case sensitive. See Figure 41.

Figure 41. The WebPAM PRO login screen



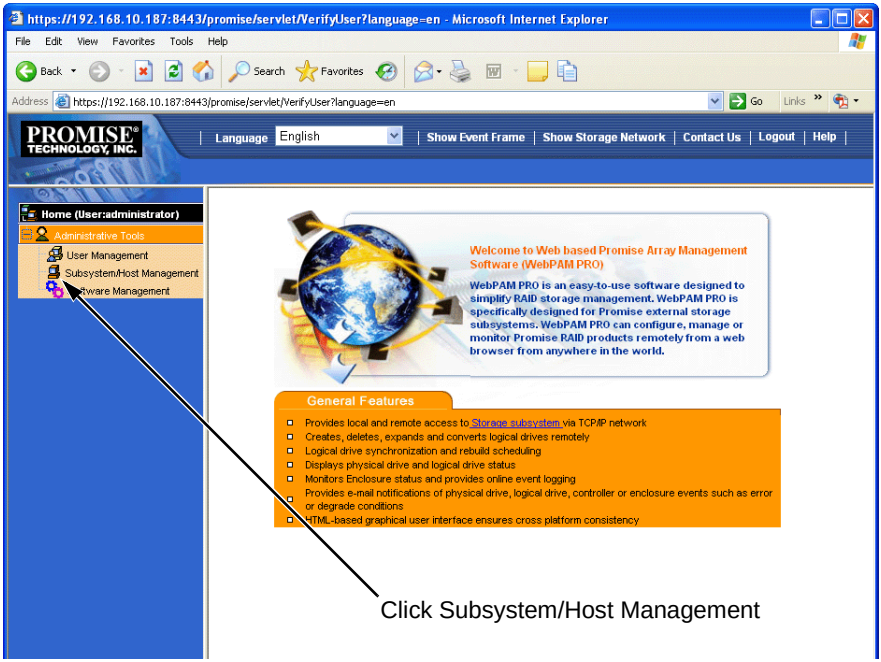
Setting up WebPAM PRO

The first time you use WebPAM PRO, you must add the Host PC so that WebPAM PRO will recognize it. You only need to perform this procedure once.

To add the Host PC:

1. In the Tree, click Subsystem/Host Management.
   See Figure 42.

Figure 42. WebPAM PRO initial login screen

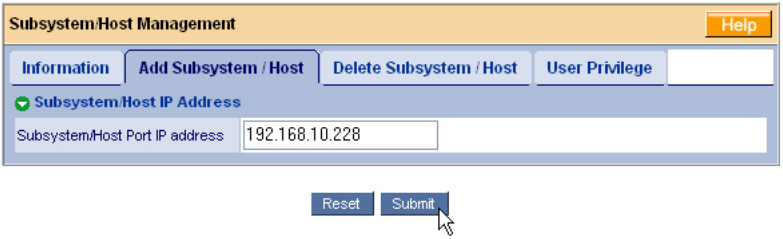

https://192.168.10.187:8443/promise/servlet/VerifyUser?language=en - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites
Address https://192.168.10.187:8443/promise/servlet/VerifyUser?language=en
Go Links
PROMISE TECHNOLOGY, INC.
Language English
Show Event Frame
Show Storage Network
Contact Us
Logout
Help
Home (User:administrator)
Administrative Tools
User Management
Subsystem/Host Management
Welcome to Web based Promise Array Management Software (WebPAM PRO)
WebPAM PRO is an easy-to-use software designed to simplify RAID storage management. WebPAM PRO is specifically designed for Promise external storage subsystems. WebPAM PRO can configure, manage or monitor Promise RAID products remotely from a web browser from anywhere in the world.
General Features
Provides local and remote access to Storage subsystem via TCP/IP network
Creates, deletes, expands and converts logical drives remotely
Logical drive synchronization and rebuild scheduling
Displays physical drive and logical drive status
Monitors Enclosure status and provides online event logging
Provides e-mail notifications of physical drive, logical drive, controller or enclosure events such as error or degrade conditions
HTML-based graphical user interface ensures cross platform consistency
Click Subsystem/Host Management

2. Click the **Add Subsystem/Host** tab.
3. In the Subsystem/Host Port IP address field, type the IP address of the Host PC where you installed the SuperTrak EX Controller card.

   If you are working at the same Host PC where the SuperTrak card is installed, you can also type **127.0.0.1** in the IP address field.

   Entries such as *localhost* or the Host PC's network name do not work for this function.

Figure 43. Add Subsystem/Host tab



4. Click the **Submit** button.

   The newly added host appears in the Tree, on the left side of the WebPAM PRO screen.

This completes the WebPAM PRO installation and initial setup. Go to “Chapter 5: Management with WebPAM PRO” on page 109 for information about using this application.

Chapter 3: Installing Drivers

- Driver Installation Media
  - Windows (page 64)
  - Linux and FreeBSD (page 65)
- Windows Server 2008
  - New OS Installation (page 66)
  - Existing System (page 67)
  - Confirming Driver Installation (page 67)
- Windows Vista
  - New OS Installation (page 68)
  - Existing System (page 69)
  - Confirming Driver Installation (page 69)
- Windows Server 2003
  - New OS Installation (page 70)
  - Existing System (page 71)
  - Confirming Driver Installation (page 71)
- Windows XP
  - New OS Installation (page 72)
  - Existing System (page 73)
  - Confirming Driver Installation (page 73)
- Red Hat Linux Enterprise 4.4, 4.5, 4.6, 4.7
  - New OS Installation (page 74)
  - Existing System (page 74)
- Fedora Core 6
  - New OS Installation (page 75)
  - Existing System (page 75)
- Fedora Core 7, 8
  - New OS Installation (page 76)
  - Existing System (page 76)
- openSUSE 10.2, 10.3, 10.5, 11
  - New OS Installation (page 77)
  - Existing System (page 77)
- SLES 10, 10 SP1, 10 SP2
  - New OS Installation (page 78)
  - Existing System (page 78)
- Miracle Linux 4
  - New OS Installation (page 80)
  - Existing System (page 81)
- FreeBSD 6.1, 6.2, 6.3, 7.0
  - New OS Installation (page 80)
  - Existing System (page 81)
- VMware ESX Server 3.0.2, 3.5.0
  - New OS Installation (page 82)
  - Existing System (page 82)

Following are installation procedures for the SuperTrak drivers for Windows, Linux, and FreeBSD included on the software CD.

Download the latest drivers from the Promise Support Website.

The software CD also includes source code files for compiling your own Linux drivers. Source code files begin with the letters *SRC*.

.

Important

If you are using a Linux distribution for which there are no compiled drivers, please access the Promise Knowledge Base and call up **Article 10029**.

Driver Installation Media

Windows

If your Windows PC does not have a floppy drive, copy the driver file to a CD or a USB stick, whichever your PC supports.

To prepare a driver diskette, CD, or USB stick for Windows:

1. Insert the software CD into your CD-ROM drive.
2. Click the **Driver** button.
3. Click the **Driver for Windows** button.
4. Click the button for your Windows system:
   - XP – **Windows SCSIPort Driver**
   - All other versions – **Windows STORPort Driver**
5. Insert a blank diskette, a writable CD, or attach a USB memory stick to your PC.
6. Copy the driver file to the diskette, CD, or USB stick.

   Check the driver's ReadMe file for important information.

Linux and FreeBSD

For FreeBSD, start with a diskette. For Linux, choose the medium that works for your system.

If your Linux PC does not have a floppy drive, copy the driver file to a CD or a USB stick, whichever your PC supports.

To prepare a driver diskette, CD, or USB stick for Linux:

1. Insert the software CD into your CD-ROM drive.
2. Click the **Driver** button.
3. Click the button for your OS:
   - **Driver for Miracle Linux**
   - **Driver for RedHat / Fedora**
   - **Driver for SUSE**
   - **Driver for FreeBSD**
4. Double-click the folder for your OS version.
5. Manually copy the driver **.tar.gz** file from the folder to your PC's hard drive.
6. Open a terminal window and untar the driver file. Below is an example:

   ```
   tar zxvf RH-306010003.tar.gz
   ```

7. Insert a blank diskette, a writable CD, or attach a USB memory stick to your PC.
8. Copy the driver file to the diskette, CD, or USB stick.

   Check the driver's ReadMe file for important information.

Windows Server 2008

New OS Installation

The following details the installation of the SuperTrak EX Series RAID Controller drivers while installing Windows Server 2008.

1. Start the installation: Boot from the CD-ROM.
2. When the “Where do you want to install Windows?” dialog box appears, click **Load Driver**.
3. Insert the SuperTrak driver diskette into drive A: or attach a USB memory stick with the SuperTrak driver to the USB port.
4. In the Load Driver dialog box, click the **Browse** button.
5. In the Browse for Folder dialog box, click the diskette or USB stick, then click the **OK** button.
6. In the “Select the driver to be installed” dialog box, highlight *Promise SuperTrak EX SAS RAID Controller*, then click the **Next** button.
7. When the “Where do you want to install Windows?” dialog box appears again, in the list of Disks, highlight the Disk representing your logical drive (the Disk with unallocated space), then click the **Next** button.
8. Continue the Windows installation.

Existing System

After installing the SuperTrak EX Series RAID Controller card and rebooting your system, Windows Server 2008 setup will show a “Found New Hardware” dialog box.

1. Choose the **Locate and install driver software** option and click the **Next** button.

   The “Found New Hardware – RAID Controller” dialog box displays the message: “Allow Windows to search online for driver software for your RAID Controller?”

2. Choose the **Don’t search online** option.

   The “Found New Hardware – RAID Controller” dialog box displays the message: “Insert the disc that came with your RAID Controller.”

3. Insert the driver diskette into the floppy drive and click the **Next** button.

   Windows loads the driver and displays the “Found New Hardware” dialog box with message: “Windows has finished installing the driver software for this device *Promise SuperTrak EX SAS RAID Controller*.”

4. Click the **Close** button to finish driver installation.

Confirming Driver Installation

1. Right-click the My Computer icon and choose *Manage* from the popup menu.
2. From the left panel, choose *Device Manager*.
3. Click the **+** in front of Storage controllers. “Promise SuperTrak EX SAS RAID Controller” and “Promise RAID Console” should appear.

Windows Vista

New OS Installation

The following details the installation of the SuperTrak EX Series RAID Controller drivers while installing Windows Vista.

1. Start the installation: Boot from the CD-ROM.
2. When the “Where do you want to install Windows?” dialog box appears, click **Load Driver**.
3. Insert the SuperTrak driver diskette into drive A: or attach a USB memory stick with the SuperTrak driver to the USB port.
4. In the Load Driver dialog box, click the **Browse** button.
5. In the Browse for Folder dialog box, click the diskette or USB stick, then click the **OK** button.
6. In the “Select the driver to be installed” dialog box, highlight *Promise SuperTrak EX SAS RAID Controller*, then click the **Next** button.
7. When the “Where do you want to install Windows?” dialog box appears again, in the list of Disks, highlight the Disk representing your logical drive (the Disk with unallocated space), then click the **Next** button.
8. Continue the Windows installation.

Existing System

After installing the SuperTrak EX Series RAID Controller card and rebooting your system, Windows Vista setup will show a “Found New Hardware” dialog box.

1. Choose the **Locate and install driver software** option and click the **Next** button.

   The “Found New Hardware – RAID Controller” dialog box displays the message: “Allow Windows to search online for driver software for your RAID Controller?”

2. Choose the **Don’t search online** option.

   The “Found New Hardware – RAID Controller” dialog box displays the message: “Insert the disc that came with your RAID Controller.”

3. Insert the driver diskette into the floppy drive and click the **Next** button.

   Windows loads the driver and displays the “Found New Hardware” dialog box with message: “Windows has finished installing the driver software for this device *Promise SuperTrak EX SAS RAID Controller*.”

4. Click the **Close** button to finish driver installation.

Confirming Driver Installation

1. Right-click the My Computer icon and choose *Manage* from the popup menu.
2. From the left panel, choose *Device Manager*.
3. Click the **+** in front of Storage controllers. “Promise SuperTrak EX SAS RAID Controller” and “Promise RAID Console” should appear.

Windows Server 2003

New OS Installation

The following details the installation of the SuperTrak EX Series RAID Controller drivers while installing Windows Server 2003.

1. Start the installation:
   - Floppy Install: Boot the computer with the Windows Server 2003 installation diskettes.
   - CD-ROM Install: Boot from the CD-ROM. Press F6 after the message “Press F6 if you need to install third party SCSI or RAID driver” appears.
2. When the Windows Server 2003 Setup window is generated, press S to specify an Additional Device(s).
3. Insert the SuperTrak driver diskette into drive A: and press Enter.
4. Choose *Promise SuperTrak EX SAS RAID Controller* from the list that appears on screen, and then press the Enter.
5. The Windows Server 2003 Setup screen will appear again saying “Setup will load support for the following mass storage devices:” The list will include “Promise SuperTrak EX SAS RAID Controller”.

   NOTE: If there are any additional devices to be installed, specify them now. When all devices are specified, continue to the next step.
6. From the Windows Server 2003 Setup screen, press the Enter. Setup will now load all device files and then continue the Windows Server 2003 installation.

Existing System

After installing the SuperTrak EX Series RAID Controller card and rebooting your system, Windows Server 2003 setup will show a “Found New Hardware” dialog box. Under Windows 2003, “RAID Controller” will be displayed.

1. Insert the SuperTrak driver diskette into the A:\ drive.
2. Choose *Install the software automatically* and press the Enter key.
3. If using a driver that has not been digitally signed by Microsoft, you will be asked if you want to continue the installation. Click **Continue anyway**.
4. When the New Hardware Wizard has finished installing the SuperTrak driver, click **Finish**.

Confirming Driver Installation

1. Right-click the My Computer icon and choose *Manage* from the popup menu.
2. From the left panel, choose *Device Manager*.
3. Click the **+** in front of SCSI and RAID controllers. “Promise SuperTrak EX SAS RAID Controller” and “Promise RAID Console” should appear.

Windows XP

New OS Installation

The following details the installation of the SuperTrak EX Series RAID Controller drivers while installing Windows XP.

1. Start the installation:
   - Floppy Install: Boot the computer with the Windows XP installation diskettes.
   - CD-ROM Install: Boot from the CD-ROM. Press F6 after the message “Press F6 if you need to install third party SCSI or RAID driver” appears.
2. When the Windows XP Setup window is generated, press S to specify an Additional Device(s).
3. Insert the SuperTrak driver diskette into drive A: and press Enter.
4. Choose *Promise SuperTrak EX SAS RAID Controller* from the list that appears on screen, and then press the Enter.
5. The Windows XP Setup screen will appear again saying “Setup will load support for the following mass storage devices:” The list will include “Promise SuperTrak EX SAS RAID Controller”.

   NOTE: If there are any additional devices to be installed, specify them now. When all devices are specified, continue to the next step.
6. From the Windows XP Setup screen, press the Enter. Setup will now load all device files and then continue the Windows XP installation.

Existing System

After installing the SuperTrak EX Series RAID Controller card and rebooting your system, Windows XP setup will show a “Found New Hardware” dialog box.

1. Insert the SuperTrak driver diskette into the A:\ drive.
2. Choose Install the software automatically and press the Enter key.
3. If using a driver that has not been digitally signed by Microsoft, you will be asked if you want to continue the installation. Click **Continue anyway**.
4. When the New Hardware Wizard has finished installing the SuperTrak driver, click **Finish**.

Confirming Driver Installation

1. Right-click the My Computer icon and choose *Manage* from the popup menu.
2. From the left panel, choose *Device Manager*.
3. Click the **+** in front of SCSI and RAID controllers. “Promise SuperTrak EX SAS RAID Controller” and “Promise RAID Console” should appear.

Red Hat Linux Enterprise 4.4, 4.5, 4.6, 4.7

New OS Installation

1. Start the RedHat Linux Installation by booting from the install CD.
2. At the “Welcome to Red Hat Linux...” installation screen, a prompt labeled **boot:** will appear at the bottom of the screen. Type **linux dd** and press Enter.
3. When the Installer asks, “Do you have a driver disk?” click **Yes**.
4. At the “Insert your driver disk and press OK to continue,” click **OK**.

   At the Devices dialog box, insert the driver diskette or CD, or attach the USB stick and click **OK**.
5. Continue with the installation normally.

Note: Check the readme file, included with the downloaded driver files, for instructions on installing the RAID Console.

Note: The RHEL 5 kernel includes a SuperTrak driver.

Existing System

1. Insert the driver diskette or CD, or attach the USB stick.
2. Log in as *root*.
3. Type **mount -r /dev/fd0 /mnt/floppy**.

   Change this command as needed for a CD or USB stick.
4. Type **cd /mnt/floppy**

   Change this command as needed for a CD or USB stick.
5. Type **sh ./install**.
6. When the Installer asks, “You are installing a driver on an existing OS. Is it true (y/n)?” press Y, then press Enter.
7. Type **cd /umount /mnt/floppy**.

   Change this command as needed for a CD or USB stick.
8. Remove the driver diskette, CD, or USB stick.
9. Type **reboot** to restart the system.

Fedora Core 6

New OS Installation

1. Start the Fedora Core Installation by booting from the install CD.
2. At the “Welcome to Fedora 6...” installation screen, a prompt labeled **boot:** will appear at the bottom of the screen. Type **linux dd acpi=off** and press Enter.
3. When the Installer asks, “Do you have a driver disk?” click **Yes**.
4. At the “Insert your driver disk and press OK to continue,” click **OK**.

   At the Devices dialog box, insert the driver diskette or CD, or attach the USB stick and click **OK**.
5. Continue with the installation normally.

Note: Include **acpi=off** in the boot script to ensure proper system startup.

Existing System

1. Insert the driver diskette or CD, or attach the USB stick.
2. Log in as *root*.
3. Type **mount -r /dev/fd0 /mnt/floppy**.

   Change this command as needed for a CD or USB stick.
4. Type **cd /mnt/floppy**

   Change this command as needed for a CD or USB stick.
5. Type **sh ./install**.
6. When the Installer asks, “You are installing a driver on an existing OS. Is it true (y/n)?” press Y, then press Enter.
7. Type **cd /umount /mnt/floppy**.

   Change this command as needed for a CD or USB stick.
8. Remove the driver diskette, CD, or USB stick.
9. Type **reboot** to restart the system.

Note: Include **acpi=off** in the boot script to ensure proper system startup.

Fedora Core 7, 8

New OS Installation

1. Start the Fedora Core Installation by booting from the install CD.
2. At the “Welcome to Fedora...” installation screen, highlight the *Install or upgrade an existing system* option, then press the Tab key for edit options.

   A prompt labeled **boot:** will appear at the bottom of the screen.
3. Type **linux dd** and press Enter.
4. When the Installer asks, “Do you have a driver disk?” click **Yes**.
5. At the “Insert your driver disk and press OK to continue,” click **OK**.

   At the Devices dialog box, insert the driver diskette or CD, or attach the USB stick and click **OK**.
6. Continue with the installation normally.

Note: For Fedora Core 7, include **acpi=off** in the boot script to ensure proper system startup.

Existing System

1. Insert the driver diskette or CD, or attach the USB stick.
2. Log in as *root*.
3. Type **mount -r /dev/fd0 /mnt/floppy**.

   Change this command as needed for a CD or USB stick.
4. Type **cd /mnt/floppy**

   Change this command as needed for a CD or USB stick.
5. Type **sh ./install**.
6. When the Installer asks, “You are installing a driver on an existing OS. Is it true (y/n)?” press Y, then press Enter.
7. Type **cd /umount /mnt/floppy**.

   Change this command as needed for a CD or USB stick.
8. Remove the driver diskette, CD, or USB stick.
9. Type **reboot** to restart the system.

Note: For Fedora Core 7, include **acpi=off** in the boot script to ensure proper system startup.

openSUSE 10.2, 10.3, 10.5, 11

New OS Installation

1. Start the SUSE Linux Installation by booting from the install CD.
2. As the system boots, press F6 for the driver diskette, CD, or USB stick.
3. Choose the *Yes* option.
4. Move the cursor to highlight the *Installation* option, then press Enter.
5. When the Driver Update Menu pops up, choose your *driver diskette*, *CD*, or *USB stick*.

   Then click **OK** and click **Back** to return to the installer.
6. Follow the on-screen prompts to complete the installation.

Existing System

1. Insert the driver diskette or CD, or attach the USB stick.
2. Log in as *root*.
3. Type **mount /dev/fd0 /media/floppy**.

   Change this command as needed for a CD or USB stick.
4. Type **cd /media/floppy**

   Change this command as needed for a CD or USB stick.
5. Type **sh ./install**.
6. Type **cd /umount /media/floppy**.

   Change this command as needed for a CD or USB stick.
7. Remove the driver diskette, CD, or USB stick.
8. Type **reboot** to restart the system.

SLES 10, 10 SP1, 10 SP2

New OS Installation

1. Start the SLES Linux Installation by booting from the install CD.
2. As the system boots, press F5 for the driver diskette, CD, or USB stick.
3. Choose the *Yes* option.
4. Move the cursor to highlight the *Installation – ACPI Disabled* option, then press Enter.
5. When the Driver Update Menu pops up, choose your *driver diskette*, *CD*, or *USB stick*.

   Then click **OK** and click **Back** to return to the installer.
6. Follow the on-screen prompts to complete the installation.

Existing System

1. Insert the driver diskette or CD, or attach the USB stick.
2. Log in as *root*.
3. Type **mount /dev/fd0 /media/floppy**.

   Change this command as needed for a CD or USB stick.
4. Type **cd /media/floppy**

   Change this command as needed for a CD or USB stick.
5. Type **sh ./install**.
6. Type **cd /umount /media/floppy**.

   Change this command as needed for a CD or USB stick.
7. Remove the driver diskette, CD, or USB stick.
8. Type **reboot** to restart the system.

Miracle Linux 4

New OS Installation

1. Start the Miracle Linux Installation by booting from the install CD.
2. At the “Asianux” installation screen, a prompt labeled **boot:** will appear at the bottom of the screen. Type **linux dd** and press Enter.
3. When the Installer asks, “Do you have a driver disk?” click **Yes**.
4. At the “Insert your driver disk and press OK to continue,” insert the driver diskette or CD, or attach the USB stick and click **OK**.
5. Continue with the installation normally.

Note: The Miracle Linux 5 kernel includes a SuperTrak driver.

Existing System

1. Insert the driver diskette or CD, or attach the USB stick.
2. Log in as *root*.
3. Type **mount -r /dev/fd0 /mnt/floppy**.

   Change this command as needed for a CD or USB stick.
4. Type **cd /mnt/floppy**

   Change this command as needed for a CD or USB stick.
5. Type **sh ./install**.
6. When the Installer asks, “You are installing a driver on an existing OS. Is it true (y/n)?” press Y, then press Enter.
7. Type **cd /umount /mnt/floppy**.

   Change this command as needed for a CD or USB stick.
8. Remove the driver diskette, CD, or USB stick.
9. Type **reboot** to restart the system.

FreeBSD 6.1, 6.2, 6.3, 7.0

New OS Installation

1. Start the FreeBSD Installation by booting from the install CD.
2. When the console menu appears, choose *6. Escape to loader prompt* and press any key *except* Enter to confirm your choice.
3. Insert the driver diskette.
4. Type the following commands and press Enter:

   ```
   set currdev=disk0
   load /stex.ko
   set currdev=cd0
   boot
   ```

5. Remove the driver diskette and continue the installation.
6. When the installation is finished, DO NOT EXIT.

   Press Alt-F4 to switch to another screen.
7. Verify whether a device node exists.

   Type the following command and press Enter.

   ```
   ls /dev/fd0
   ```

Option 1. Device Node Exists

1. Type the following commands and press Enter.

   ```
   mount -t msdos /dev/fd0 /cdrom
   /cdrom/install
   ```

2. After those commands finish, type the following command and press Enter.

   ```
   umount /cdrom
   ```

3. Remove the driver diskette.
4. Press Alt+F1, exit the installation, and reboot your PC.

Option 2. Device Node Does Not Exist

1. Obtain a blank USB device, a disk drive or a memory stick, formatted to FAT or FAT32 (MSDOS).
2. Copy the files from the driver diskette to the root directory of the USB device.
3. Attach the USB device to the PC.
4. Type the following commands and press Enter.

   ```
   mount -t msdos /dev/daXsX /cdrom
   /cdrom/install
   ```

   Where /dev/daXs is the device node for the USB device.

5. After those commands finish, type the following command and press Enter.
   umount /cdrom
6. Remove the USB device.
7. Press Alt+F1, exit the installation, and reboot your PC.

Existing System

1. Insert the driver diskette or CD, or attach the USB stick.
2. Log in as *root*.
3. Type **mount -r /dev/fd0 /mnt/floppy**.
   Change this command as needed for a CD or USB stick.
4. Type **cd /mnt/floppy**
   Change this command as needed for a CD or USB stick.
5. Type **./load**.
6. Type **cd /umount /mnt/floppy**.
   Change this command as needed for a CD or USB stick.
7. Remove the driver diskette, CD, or USB stick.
8. Type **reboot** to restart the system.

VMware ESX Server 3.0.2, 3.5.0

New OS Installation

1. Download the VMware driver ISO image from the Promise Support Website.
2. Burn the VMware driver ISO image to a CD.
3. Place the driver CD in the CD-ROM drive.
4. Reboot the computer.
5. When prompted for an upgrade or installation method, press Enter for graphical mode.
6. Specify your language.
7. Select a keyboard type.
8. If your Driver CD successfully loaded, you will be prompted to insert the ESX Server CD and restart.
9. Continue with the ESX Server installation.

Existing System

1. Download the VMware driver ISO image from the Promise Support Website.
2. Burn the VMware driver ISO image to a CD.
3. Log into the system as the Superuser.
4. Insert the driver CD into the CD-ROM.

   If CD does not mount automatically, type the following command and press Enter:

   ```
   mount /mnt/cdrom
   ```

5. Type the following command and press Enter to install the driver RPM:

   ```
   rpm -ivh /mnt/cdrom/VMupdates/RPMS/VMware-esx-
   drivers-scsi-stex-<driver version>-i386.rpm
   ```

   If the installation fails due to conflicts, try installing with the --force option.

6. Type the following commands and press Enter to update the boot file and regenerate GRUB:

   ```
   esxcfg-boot -rg
   esxcfg-boot -b
   ```

   If the ESX Server did not install on the SuperTrak EX controller, copy **stex.o**
   From /usr/lib/vmware/vmkmod/
   To /lib/modules/2.4.xxxxx/kernel/drivers/scsi/
7. Reboot ESX Server.

8. Remove the CD from the CD-ROM.

Note: If the driver did not load after the server rebooted, try one of the following actions to make the ESX Server reconfigure its hardware settings:

- Move the SuperTrak EX controller to a different slot.
- Remove the existing SuperTrak EX controller and install a different SuperTrak EX controller in its place.

Chapter 4: SuperBuild™ Utility

- SuperTrak BIOS (below)
- Accessing the Main Menu (page 88)
- Selecting a Controller (page 89)
- Viewing Controller Information (page 89)
- Managing Physical Drives (page 90)
- Managing Disk Arrays (page 92)
- Managing Logical Drives (page 95)
- Managing Spare Drives (page 99)
- Viewing Background Activity (page 102)
- Managing the Event Log (page 103)
- Working with Time Sync (page 105)
- Using the Miscellaneous Menu (page 106)

SuperTrak BIOS

This section explains the information that you can obtain from the SuperTrak BIOS.

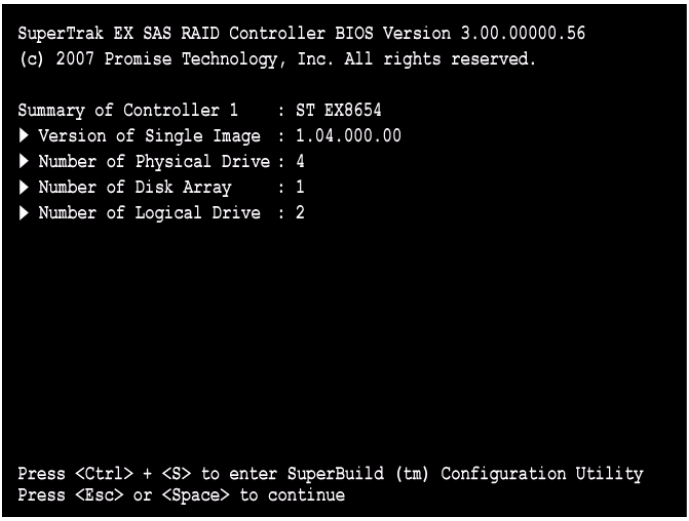
When the SuperTrak BIOS loads during bootup, the BIOS displays pertinent information about the RAID logical drives. At this point, press Ctrl-S to enter the SuperBuild Configuration Utility.

The SuperTrak BIOS screen displays the following information:

- **Summary of Controller** – The SuperTrak controller model number.
- **Version of Single Image** – The version number of the image used to update the firmware on the SuperTrak controller.
- **Number of Physical Drives** – The number of physical drives attached to this controller.
- **Number of Disk Arrays** – The number of disk arrays managed by this controller.
- **Number of Logical Drives** – The number of logical drives managed by this controller.

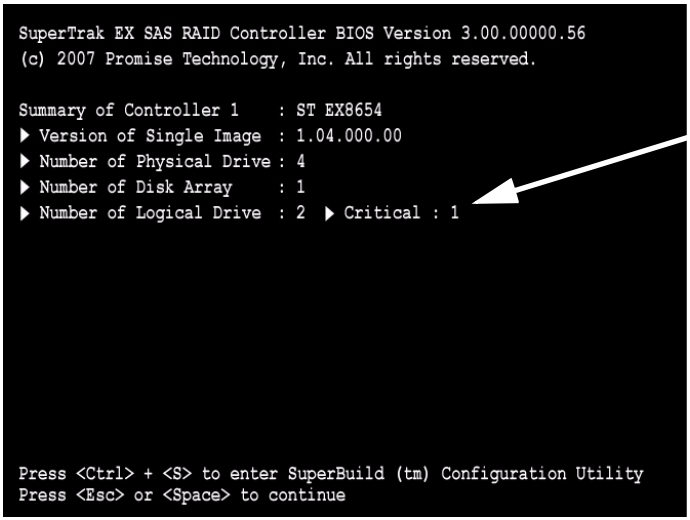
See Figure 1.

Figure 1. SuperTrak BIOS screen


SuperTrak EX SAS RAID Controller BIOS Version 3.00.00000.56
(c) 2007 Promise Technology, Inc. All rights reserved.
Summary of Controller 1 : ST EX8654
Version of Single Image : 1.04.000.00
Number of Physical Drive : 4
Number of Disk Array : 1
Number of Logical Drive : 2
Press <Ctrl> + <S> to enter SuperBuild (tm) Configuration Utility
Press <Esc> or <Space> to continue

If the SuperBuild BIOS detects a *Critical* logical drive, the BIOS reports the condition:

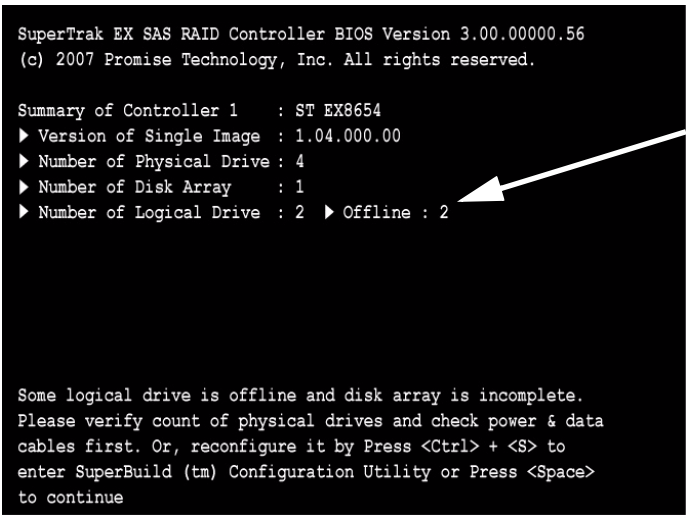
Figure 2. SuperTrak BIOS screen, logical drive critical


SuperTrak EX SAS RAID Controller BIOS Version 3.00.00000.56
(c) 2007 Promise Technology, Inc. All rights reserved.
Summary of Controller 1 : ST EX8654
Version of Single Image : 1.04.000.00
Number of Physical Drive : 4
Number of Disk Array : 1
Number of Logical Drive : 2 Critical : 1
Press <Ctrl> + <S> to enter SuperBuild (tm) Configuration Utility
Press <Esc> or <Space> to continue

See “Critical & Offline Logical Drives” on page 267 for information about restoring an offline logical drive.

If the SuperTrak BIOS detects an *Offline* logical drive, the BIOS reports the condition and temporarily halts the booting process of the Host PC.

Figure 3. SuperTrak BIOS screen, logical drive offline

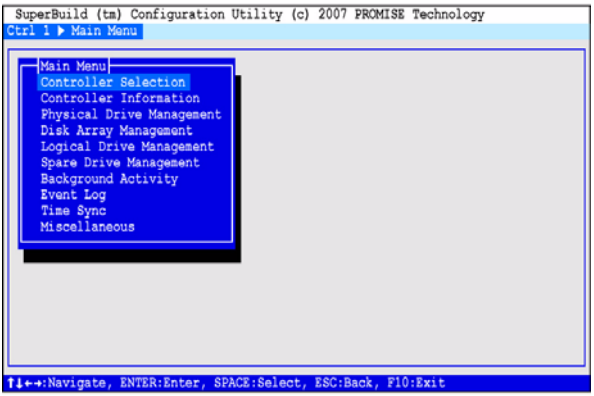

SuperTrak EX SAS RAID Controller BIOS Version 3.00.00000.56
(c) 2007 Promise Technology, Inc. All rights reserved.
Summary of Controller 1 : ST EX8654
Version of Single Image : 1.04.000.00
Number of Physical Drive : 4
Number of Disk Array : 1
Number of Logical Drive : 2 Offline : 2
Some logical drive is offline and disk array is incomplete.
Please verify count of physical drives and check power & data
cables first. Or, reconfigure it by Press <Ctrl> + <S> to
enter SuperBuild (tm) Configuration Utility or Press <Space>
to continue

See “Critical & Offline Logical Drives” on page 267 for information about restoring an offline logical drive.

Accessing the Main Menu

The opening screen of the SuperBuild utility is the Main Menu.

Figure 4. SuperBuild Main Menu



The Main Menu (above) has nine options:

- **Controller Selection** – Select which of two SuperTrak controllers you want to access, if you have two SuperTraks installed in the Host PC
- **Controller Information** – Memory type and size, Firmware and BIOS version numbers, and address information that may be helpful for diagnostic purposes
- **Physical Drive Management** – A list of physical drives attached to the SuperTrak controller, their ID (channel) numbers, model numbers, capacity, and status
- **Disk Array Management** – A list of disk arrays attached to the SuperTrak controller, the assigned physical drives, logical drives, capacity, and status
- **Logical Drive Management** – A list of logical drives plus create and delete logical drive functions
- **Spare Drive Management**– A list of hot spare drives, their characteristics and status
- **Background Activity** – A list of logical drives, any current background activity, logical drive status and percentage of activity completed. Background activities include: Rebuild, Initialize, Synchronize, Migrate, and Pause/Resume
- **Event Log** – A list of events stored in RAM (since startup) or non-volatile RAM (since the log was cleared) for diagnosis
- **Time Sync** – Enables you to set the time zone and synchronize system time and date with the embedded site

- **Miscellaneous** – SAS drive LEDs, enclosure management, and buzzer settings

Selecting a Controller

The SuperBuild Configuration utility supports up to two SuperTrak RAID Controller cards installed in the same Host PC. Controller selection enables you to select which of the two SuperTrak controllers the utility accesses.

If you have only one SuperTrak card installed in the Host PC, the SuperTrak is Controller 1, and no selection is necessary.

If you have two SuperTrak cards installed in the Host PC, take the following action to select one of them:

1. In the Main Menu, highlight *Controller Selection* and press Enter.
2. Highlight *Controller 1* or *Controller 2* and press Enter.

   The selected controller (SuperTrak card) displays in the SuperBuild utility.

Viewing Controller Information

The SuperBuild utility displays information about the selected SuperTrak EX controller.

1. In the Main Menu, highlight *Controller Information* and press Enter.

   The information includes:

   Vendor – Promise Technology, Inc.

   Model – SuperTrak EX4650, 8650, 8654, EX8658, or EX16650

   WWN – World Wide Number of the SuperTrak controller

   Memory Type – DDR2 SDRAM

   Memory Size – 128 MB, 256 MB, or 512 MB

   Single Image Ver – The version number of the image used to update the firmware on the SuperTrak EX controller.*

   Firmware Version – The version number of the firmware currently installed on the SuperTrak EX controller.*

   BIOS Version – The version number of the BIOS currently installed on the SuperTrak EX controller.*

   PCI Func Address – The functional address of the SuperTrak card in the Host PC. Used for advanced diagnostics

   * The BIOS and Firmware are upgradable. See “Downloading BIOS and Firmware File” on page 289 and See “Updating the Firmware” on page 132.
2. Highlight *Return to Previous Menu* and press Enter.

Managing Physical Drives

Physical drive management includes these functions:

- Viewing Physical Drives (page 90)
- Viewing Physical Drive Information (page 90)
- Managing Physical Drive Problems (page 91)

Viewing Physical Drives

To view physical drives:

1. In the Main Menu, highlight *Physical Drive Management* and press Enter.

   The information includes:

   ID – The channel number of the SuperTrak controller to which the physical drive is attached

   Model Name – The physical drive manufacturer's model name for the drive

   Capacity – Data capacity of the physical drive

   Status – OK is normal. Can also show Rebuilding or Dead.
2. Highlight *Return to Previous Menu* and press Enter.

Viewing Physical Drive Information

The SuperBuild utility displays information about the physical (disk) drives attached to the SuperTrak controller.

1. In the Main Menu, highlight *Physical Drive Management* and press Enter.
2. Highlight the physical drive you want to see and press Enter.

   The Physical Drive Information screen displays:

   ID – The channel number of the SuperTrak controller to which this physical drive is attached.

   Model Name – The drive manufacturer's model name.

   Serial Number – The drive manufacturer's serial number.

   Firmware Version – The drive's firmware version number.

   Drive Interface – SAS or SATA, 3.0 or 1.5 Gb/s

   Protocol – ATA/ATAPI protocol level.

   Capacity – Data capacity of the physical drive in GB.

   Location – Enclosure refers to the Host PC. Slot refers to the channel number of the SuperTrak controller.

   Configuration – Disk array number and sequence number, Type of spare drive, or Unconfigured.

   Status – OK is normal. Can also show Rebuilding, Stale, or Dead.

3. Highlight *Return to Previous Menu* and press Enter.

Managing Physical Drive Problems

Physical drives can develop problems that make them unsuitable for service in a logical drive. These problems are reflected in the physical drive status:

- **PFA** – The physical drive has errors resulting in a prediction of failure
- **Stale** – Caused by obsolete array information on the physical drive
- **Offline** – The physical drive is present but set to Offline status
- **Dead** – Physical drive set down by the SuperTrak controller

See “Chapter 8: Troubleshooting” on page 261 for corrective action.

Managing Disk Arrays

Disk array management includes these functions:

- Viewing Disk Arrays (page 92)
- Viewing Disk Array Information (page 92)
- Creating a Disk Array (page 93)
- Changing Disk Array Settings (page 94)
- Rebuilding a Disk Array (page 94)
- Deleting a Disk Array (page 94)

Viewing Disk Arrays

The SuperBuild utility displays information about the disk arrays managed by the SuperTrak controller.

1. In the Main Menu, highlight *Disk Array Management* and press Enter.

   The information includes:

   ID – The consecutive number of the disk array in the order it was created, beginning with 0.

   Disk Array Name – The name you assigned to the disk array.

   Capacity – Data capacity of the disk array in GB.

   Status – OK is normal. Can also show Rebuilding, Degraded, Critical, or Offline.
2. Highlight *Return to Previous Menu* and press Enter.

Viewing Disk Array Information

To view disk array information:

1. In the Main Menu, highlight *Disk Array Management* and press Enter.

   The Disk Array Management screen displays.
2. Highlight the Disk Array you want to see and press Enter.

   The Disk Array Info and Setting screen displays. The information includes:

   Disk Array ID – The consecutive number of the disk array in the order it was created, beginning with 0

   Disk Array Name – The name you assigned to the disk array

   Capacity (Free) – Total data capacity of the disk array in GB

   Capacity (Configurable) – Usable data capacity of the disk array in GB

   Number of Physical Drives – Number of physical drives in this disk array

   Number of Logical Drives – Number of logical drives in this disk array

Status – OK is normal. Can also show Rebuilding, Degraded, Critical, or Offline.

3. Highlight *Physical Drives in the Disk Array* and press Enter.

   The following information displays:

   ID – The channel number of the SuperTrak controller to which the physical drive is attached

   Model Name – The physical drive manufacturer's model name for the drive

   Capacity – Data capacity of the physical drive in GB

   Status – OK is normal. Can also show Rebuilding or Dead.

4. Highlight *Logical Drives in the Disk Array* and press Enter.

   The following information displays:

   ID – The consecutive number of the logical drive in the order it was created, beginning with 0

   Logical Drive Name – The user-assigned name for the logical drive

   Capacity – Data capacity of the logical drive in GB

   Status – Shows one of seven logical drive conditions: OK, Critical, Offline, Init, Migration, Synchron, and Rebuild.

5. Highlight *Return to Previous Menu* and press Enter.

Creating a Disk Array

1. In the Main Menu, highlight *Disk Array Management* and press Enter.

   The Disk Array Management screen displays.

2. Highlight *Create Disk Array* and press Enter.

   The Create Disk Array screen displays.

3. Optional. Press the arrow keys to highlight *Disk Array Name* and press Enter. Then type a name for this disk array.

4. Press the arrow keys to highlight the physical drives you want to add to this disk array. Then press the spacebar to select the physical drives.

   An asterisk (*) appears at the left of each selected physical drive.

   Note that you cannot mix Hard Disk Drives (HDD) and Solid State Drives (SSD) in the same disk array.

5. Highlight *Save Configuration* and press Enter.

   The new disk array appears under Disk Array Management. If you have more physical drives available, you can create additional disk arrays following the same procedure.

   After you have created your disk arrays, Your next action is to create one or more logical drives. See “Creating a Logical Drive” on page 96.

Changing Disk Array Settings

To change the name of a disk array:

1. In the Main Menu, highlight *Disk Array Management* and press Enter.

   The Disk Array Management screen displays.

2. Highlight the Disk Array you want to change and press Enter.

   The Disk Array Info and Setting screen displays.

3. Highlight *Disk Array Name* and press Enter.
4. Press the backspace or delete keys to remove the characters. Then type new characters.
5. Highlight *Save Setting* and press Enter.
6. Highlight *Return to Previous Menu* and press Enter.

Rebuilding a Disk Array

See “Rebuilding a Disk Array Automatically” on page 270 and “Rebuilding a Disk Array Manually” on page 270 for instructions.

Deleting a Disk Array

Warning

When you delete a disk array, you also delete any logical drives that belong to it, along with the data in those logical drives. Back up any important data before deleting a disk array.

To delete a disk array:

1. In the Main Menu, highlight *Disk Array Management* and press Enter.

   The Disk Array Management screen displays.

2. Highlight the disk array you want to delete and press the spacebar to mark the disk array.

   An asterisk (*) appears at the left of the selected disk array.

3. Highlight *Delete Selected Disk Arrays* and press Enter.
4. Press Y to confirm disk array deletion.

   The selected disk array is removed from the list.

Managing Logical Drives

Logical drive management includes these functions:

- Viewing Logical Drives (page 95)
- Viewing Logical Drive Information (page 95)
- Creating a Logical Drive (page 96)
- Initializing a Logical Drive (page 97)
- Changing Logical Drive Settings (page 98)
- Deleting a Logical Drive (page 98)

Note

For an explanation of the logical drive concepts and the choices you can make when you create your logical drive, see “Chapter 7: Technology Background” on page 227.

For information about logical drive problems, see “Chapter 8: Troubleshooting” on page 261.

Viewing Logical Drives

To view your logical drives:

1. In the Main Menu, highlight *Logical Drive Management* and press Enter.

   The Logical Drive Management screen displays the following information:

   ID – The consecutive number of the logical drive in the order it was created, beginning with 0

   Logical Drive Name – The user-assigned name for the logical drive

   Capacity – Data capacity of the logical drive in GB

   Status – OK is normal. Can also show Rebuilding, Initializing, Synchronizing, Degraded, Critical, or Offline.
2. Highlight *Return to Previous Menu* and press Enter.

Viewing Logical Drive Information

To view logical drive information:

1. In the Main Menu, highlight *Logical Drive Management* and press Enter.

   The Logical Drive Management screen displays.
2. Highlight the logical drive you want to see and press Enter.

   The Logical Drive Info and Setting screen displays. The information includes:

   Logical Drive ID – The consecutive number of the logical drive in the order it was created, beginning with 0.

Logical Drive Name – You can change this setting.

Capacity – Data capacity of the logical drive in GB

RAID Level – Chosen when the logical drive was created.

Stripe Size – Chosen when the logical drive was created.

Sector Size – Chosen when the logical drive was created.

Write Cache Policy – You can change this setting.

Read Cache Policy – You can change this setting.

Disk Array ID – Consecutive number of the disk array to which this logical drive belongs

Status – OK is normal. Can also show Rebuilding, Initializing, Synchronizing, Degraded, Critical, or Offline.

3. Highlight *Return to Previous Menu* and press Enter.

Creating a Logical Drive

You must create a disk array before you can create a logical drive. See “Creating a Disk Array” on page 93.

To create a logical drive:

1. In the Main Menu, highlight *Logical Drive Management* and press Enter.

   The Logical Drive Management screen displays.

2. Highlight *Create Logical Drive* and press Enter.

   The Create Logical Drive Step 1/2 screen appears.

3. Press the arrow keys to highlight a disk array. Then press the spacebar to select the disk array.

   An asterisk (*) appears at the left of the selected disk array.

   Highlight *Next Step* and press Enter.

   The Create Logical Drive Step 2/2 screen displays.

4. Press the arrow keys to highlight the item you want to change, then press Enter to select the item:
   - **Logical Drive Name** – Optional. Type a name.
   - **RAID Level** – Choose a new RAID level. Your choices depend upon the number of physical drives in your disk array.
   - **Capacity** – 0 means the full capacity or the remaining capacity of the disk array will be used for this logical drive.
   - **Stripe Size** – *Choose from 64 KB, 128 KB, 256 KB, 512 KB, and* 1 MB. 64 KB is the default.
   - **Sector Size** – Choose from *512 B*, *1 KB*, *2 KB*, and *4 KB*. 512 B is the default.

- **Write Cache Policy** – Choose from *Write Back* or *Write Through*.
- **Read Cache Policy** – Choose from *Read Cache*, *Read Ahead*, or *No Cache*.
- **Axle** – RAID 50 and 60 logical drives only. Choose the number of axles or choose 0 to let the controller decide for you.

5. Highlight *Save Configuration* and press Enter.

   At this point you can create additional logical drives, if there is space remaining on your disk arrays. To create another logical drive, repeat steps 2 though 5 above.

6. Press the F10 key to exit the SuperBuild utility and press Y to confirm and restart the computer.

   Do not press the Ctrl-Alt-Del keys. Do not press the Esc key.

Important

- Promise recommends that you Initialize your logical drives immediately after you create them.
- You must be partition and format your new logical drives before your operating system will recognize them.

Initializing a Logical Drive

Promise recommends that you Initialize your logical drives immediately after you create them. Initialization sets all data bits in the logical drive to zero, removing any residual data left behind from earlier configurations. You can also perform an Initialization on an existing logical drive.

Warning

When you initialize a logical drive, you delete all data on the logical drive. Backup any important data before you initialize a logical drive!

1. In the Main Menu, highlight *Logical Drive Management* and press Enter.

   The Logical Drive Management screen displays.

2. Highlight the logical drive you want to initialize and press Enter.
3. Highlight *Initialization Start* and press Enter.

   A message appears at the bottom of the screen.

4. Choose one of the following actions:
   - For a Full Initialization, press F.
   - For a Quick Initialization, press Q.

- To cancel Initialization, press C.

The Initialization begins immediately. If you set Initialization for multiple logical drives, they will be initialized sequentially. You can monitor Initialization progress under Background Activity.

5. Highlight *Return to Previous Menu* and press Enter.

Changing Logical Drive Settings

To change logical drive settings:

1. In the Main Menu, highlight *Logical Drive Management* and press Enter.

   The Logical Drive Management screen displays.

2. Highlight the logical drive whose settings you want to change and press Enter.

   The Logical Drive Info and Setting screen displays.

3. Press the arrow keys to highlight the item you want to change, then press Enter to select the item:
   - **Logical Drive Name** – Press the backspace or delete keys to remove the characters. Then type new characters.
   - **Write Cache Policy** – Choose from *Write Back* or *Write Through*.
   - **Read Cache Policy** – Choose from *Read Cache*, *Read Ahead*, or *No Cache*.
4. Highlight *Save Setting* and press Enter.

   The changes happen immediately.

Deleting a Logical Drive

Warning

When you delete a logical drive, you delete all data on the logical drive. Backup any important data before you delete a logical drive!

To delete a logical drive:

1. In the Main Menu, highlight *Logical Drive Management* and press Enter.

   The Logical Drive Management screen displays.

2. Highlight the logical drive you want to delete and press the spacebar to mark the logical drive.

   An asterisk (*) appears at the left of the selected logical drive.

3. Highlight *Delete Selected Logical Drives* and press Enter.
4. Press Y to confirm logical drive deletion.

   The selected logical drive is removed from the list.

Managing Spare Drives

Spare drive management includes these functions:

- Viewing Spare Drives (page 99)
- Viewing Spare Drive Information (page 99)
- Creating a Spare Drive (page 99)
- Changing Spare Drive Settings (page 100)
- Deleting a Spare Drive (page 101)

Viewing Spare Drives

To view your spare drives:

1. In the Main Menu, highlight *Spare Drive Management* and press Enter.

   ID – The consecutive number of the spare drive in the order it was created, beginning with 0

   Model Name – The physical drive manufacturer's model name

   Capacity – Data capacity of the physical drive in GB

   Status – OK is normal. Can also show Rebuilding or Dead.
2. Highlight *Return to Previous Menu* and press Enter.

Viewing Spare Drive Information

To view spare drive information:

1. In the Main Menu, highlight *Spare Drive Management* and press Enter.

   The Spare Drive Management screen displays.
2. Highlight the spare drive you want to see and press Enter.

   The Spare Drive Info and Setting screen displays. The information includes:

   Physical Drive ID – The channel number of the SuperTrak controller to which the physical drive is attached.

   Revertible – Yes or No.

   Spare Type – Global or Dedicated.

   Disk Array – ID, name, capacity, and status, for spare drives dedicated to an array
3. Highlight *Return to Previous Menu* and press Enter.

Creating a Spare Drive

For a physical drive to qualify as a spare, the drive must be:

- Unconfigured – Not part of an array
- Functional – Showing OK status

- Adequate Capacity – Same capacity or greater than the largest drive in your array
- Same Media Type – HDD or SDD, same as the other physical drives in the disk array

To create a spare drive:

1. In the Main Menu, highlight *Spare Drive Management* and press Enter.

   The Spare Drive Management screen displays.
2. Highlight *Assign Spare Drive* and press Enter.

   The Assign Spare Drive Step 1/2 screen appears.
3. Press the arrow keys to highlight a physical drive. Then press the spacebar to select the physical drive.

   An asterisk (*) appears at the left of the selected physical drive.

   Highlight *Next Step* and press Enter.

   The Assign Spare Drive 2/2 screen displays.
4. Press the arrow keys to highlight the item you want to change, then press Enter to select the item:
   - **Revertible** – *Yes* or *No*. A revertible spare drive automatically returns to its spare drive assignment after the failed physical drive in the disk array is replaced. Go to step 6.
   - **Spare Type** – *Global*, can be used by any disk array. *Dedicated*, can only be used by the assigned disk array. Go to step 5.
5. Optional. If you chose *Dedicated* in step 4, press the arrow keys to highlight a disk array. Then press the spacebar to select the disk array.

   An asterisk (*) appears at the left of the selected disk array.
6. Highlight *Save Configuration* and press Enter.

Changing Spare Drive Settings

You can change a spare drive's revertibility and type. To change spare drive settings:

1. In the Main Menu, highlight *Spare Drive Management* and press Enter.

   The Spare Drive Management screen displays.
2. Highlight the spare drive whose settings you want to change and press Enter.

   The Spare Drive Info and Setting screen displays.
3. Press the arrow keys to highlight the item you want to change, then press Enter to select the item:

- **Revertible** – *Yes* or *No*. A revertible spare drive automatically returns to its spare drive assignment after the failed physical drive in the disk array is replaced. Go to step 5.
- **Spare Type** – *Global*, can be used by any disk array. *Dedicated*, can only be used by the assigned disk array. Go to step 4.

4. Optional. If you chose *Dedicated* in step 3, press the arrow keys to highlight a disk array. Then press the spacebar to select the disk array.

   An asterisk (*) appears at the left of the selected disk array.

5. Highlight *Save Setting* and press Enter.

   The changes happen immediately.

Deleting a Spare Drive

To delete a spare drive:

1. In the Main Menu, highlight *Spare Drive Management* and press Enter.

   The Spare Drive Management screen displays.

2. Highlight the spare drive you want to delete and press the spacebar to mark the spare drive.

   An asterisk (*) appears at the left of the selected spare drive.

3. Highlight *Delete Selected Spare Drives* and press Enter.
4. Press Y to confirm spare drive deletion.

   The selected spare drive is removed from the list.

Viewing Background Activity

The Background Activity function enables you to monitor background activities are running on the SuperTrak RAID controller. Information reported includes:

- **Device** – Disk array or logical drive by ID number
- **Type** – Synchronization, Initialization, or Rebuilding
- **Status** – Running or queued (waiting)
- **Percentage** – Percent completed

The Background Activity screen does not enable you to start, pause, resume, or cancel any activity. Status of the activity, such as in-progress or paused.

To view background activity, in the Main Menu, highlight *Background Activity* and press Enter.

When you are done, highlight *Return to Previous Menu* and press Enter.

Managing the Event Log

The event log tracks events related to the SuperTrak controller and includes the following functions:

- Viewing RAM Events (page 103)
- Viewing NVRAM Events (page 103)
- Clearing the Event Logs (page 104)

Viewing RAM Events

RAM events are also called Runtime events. All recorded events happened since the last time you booted the Host PC. Displays the 1023 most recent events.

To view NVRAM events:

1. In the Main Menu, highlight *Event Log* and press Enter.

   The Event Log screen displays.
2. Optional. If NVRAM is displayed beside Select Location, highlight *Select Location* and press Enter. Then highlight *NVRAM* and press Enter.
3. Do the following actions to navigate the Event Log screen:
   - To move to the next page or screen of events, highlight *Next Page* and press Enter.
   - To move to the previous page or screen of events, highlight *Previous Page* and press Enter.
   - To see all the information about an event, highlight the event and press Enter.

Viewing NVRAM Events

NVRAM events are the most important events. These events are stored in non-volatile RAM. Displays the 63 most recent events.

To view NVRAM events:

1. In the Main Menu, highlight *Event Log* and press Enter.

   The Event Log screen displays.
2. Optional. If RAM is displayed beside Select Location, highlight *Select Location* and press Enter. Then highlight *NVRAM* and press Enter.
3. Do the following actions to navigate the Event Log screen:
   - To move to the next page or screen of events, highlight *Next Page* and press Enter.
   - To move to the previous page or screen of events, highlight *Previous Page* and press Enter.

- To see all the information about an event, highlight the event and press Enter.

Clearing the Event Logs

Clearing the event logs remove all of the events from both the RAM and NVRAM event logs. Note that the RAM log clears every time you boot the Host PC.

1. In the Main Menu, highlight *Event Log* and press Enter.

   The Event Log screen displays. You can clear both logs from the RAM or NVRAM screen.
2. Highlight *Clear All Event Logs* and press Enter.
3. Press Y to confirm event log clearing.

Working with Time Sync

The Time Sync function adds two special features to SuperTrak. These functions include:

- Setting the Time Zone (page 105)
- Synchronizing Time with an Embedded Site (page 105)

The Time Sync function does not replace or overwrite the regular date and time settings in the Host PC's BIOS or OS.

Setting the Time Zone

To set the difference between the current time zone (the time zone in which you are) and Greenwich Mean Time (GMT):

1. In the Main Menu, highlight *Time Sync* and press Enter.

   The Time Sync screen displays.

2. Highlight *Current Time Zone* and press the **+** or **–** key to change the time for the current time zone.

   Each press of the + key increments 15 minutes forward.
   Each press of the – key increments 15 minutes backward.

Synchronizing Time with an Embedded Site

This feature requires you to have installed in the Host PC a separate product that is not part of SuperTrak RAID controller.

To synchronize time with an embedded site:

1. In the Main Menu, highlight *Time Sync* and press Enter.

   The Time Sync screen displays.

2. Highlight *Sync Time with Embedded Site* and press Enter.

Using the Miscellaneous Menu

The Miscellaneous menu enables three useful functions on SuperTrak:

- Making the SAS Ready LED Setting (page 106)
- Making the SGPIO Backplane Setting (page 106)
- Working with the Buzzer (page 106)

Making the SAS Ready LED Setting

The LEDs for SAS disk drives stay on continuously to show Ready status, except when the drive is processing a command. This function enables you to turn the LEDs off.

To turn the SAS drive LEDs off:

1. In the Main Menu, highlight *Miscellaneous* and press Enter.
2. Highlight *SAS READY LED* and press Enter.
3. Highlight your choice and press Enter.
    - On – SAS drive LEDs on continuously
    - Off – SAS drive LEDs off

Making the SGPIO Backplane Setting

This function enables you to set your SuperTrak card to work your enclosure management controller through the SGPIO connection.

To choose your enclosure management controller setting:

1. In the Main Menu, highlight *Miscellaneous* and press Enter.
2. Highlight *SGPIO Backplane* and press Enter.
3. Highlight your choice and press Enter.
    - Generic
    - AIC
    - AMI
    - Chenbro
    - Direct LED
    - Supermicro

Working with the Buzzer

The buzzer sounds to inform you that your RAID system needs attention. But the buzzer does not specify the condition. When a continuous tone sounds, there are multiple alarm patterns sounding at the same time.

When the buzzer sounds, take the following actions:

- Check your disk arrays and logical drives.
- Check the Event Log. See page 103.

To silence the buzzer for the current trigger event, you must disable it.

Also see “Chapter 8: Troubleshooting” on page 261.

Enabling or Disabling the Buzzer

To enable or disable the Buzzer:

1. In the Main Menu, highlight *Miscellaneous* and press Enter.
2. Highlight *Buzzer* and press Enter.
3. Highlight your choice and press Enter.
    - Enable
    - Disable

Chapter 5: Management with WebPAM PRO

- Logging into WebPAM PRO (page 109)
- Accessing the Interface (page 112)
- Managing Users (page 118)
- Working with Subsystem/Host Management (page 122)
- Managing Software Services (page 126)
- Managing the Host (page 130)
- Managing the Subsystem (page 131)
- Managing the Controller (page 142)
- Managing Enclosures (page 148)
- Managing Physical Drives (page 149)
- Managing Disk Arrays (page 156)
- Managing Logical Drives (page 172)
- Managing Spare Drives (page 178)
- Working with the Logical Drive Summary (page 182)

This chapter describes using WebPAM PRO to monitor and manage your RAID system. This chapter is divided into sections for major WebPAM PRO components as shown above.

Logging into WebPAM PRO

You can log into WebPAM PRO in either of two ways:

- Logging in at the Host PC (page 109)
- Logging in over the Network (page 110)

Logging in at the Host PC

At the Host PC (where the SuperTrak EX Controller is installed), to log into WebPAM PRO, do one of the following actions:

- Double-click the **WebPAM PRO** desktop icon.
- Choose *WebPAM PRO* in the Windows Programs menu or the Linux Applications menu.
- Follow the steps under “Logging in over the Network” on page 110.

Logging in over the Network

You can log into WebPAM PRO from any PC with a network connection to the Host PC (where the SuperTrak EX Controller is installed).

1. Launch your Browser.
2. In the Browser address field, type the information provided below. Then press Enter.

   If you chose External SSL Security during installation (Windows, see page 45; Linux, see page 54), use the *Secure Connection*. Otherwise, use the *Regular Connection*.

Regular Connection

- WebPAM PRO uses an HTTP connection. . . . . .http://
- Enter the Host PC's IP address. 192.168.10.228
- Enter the Port number . . . . . :8080
- Add promise to launch WebPAM PRO . . . . . /promise

Together, your entry looks like this:

http://192.168.10.228:8080/promise

Secure Connection

- WebPAM PRO uses a secure HTTP connection. . . . . .https://
- Enter the Host PC's IP address. 192.168.10.228
- Enter the Port number . . . . . :8443
- Add promise to launch WebPAM PRO . . . . . /promise

Together, your entry looks like this:

https://192.168.10.228:8443/promise

Notes

- You can enter the Host PC's network name in place of the IP address.
- If you are logging in at the Host PC, you can enter **localhost** in place of the IP address.
- Whether you select a regular or a secure connection, your login to WebPAM PRO and your user password are always secure.

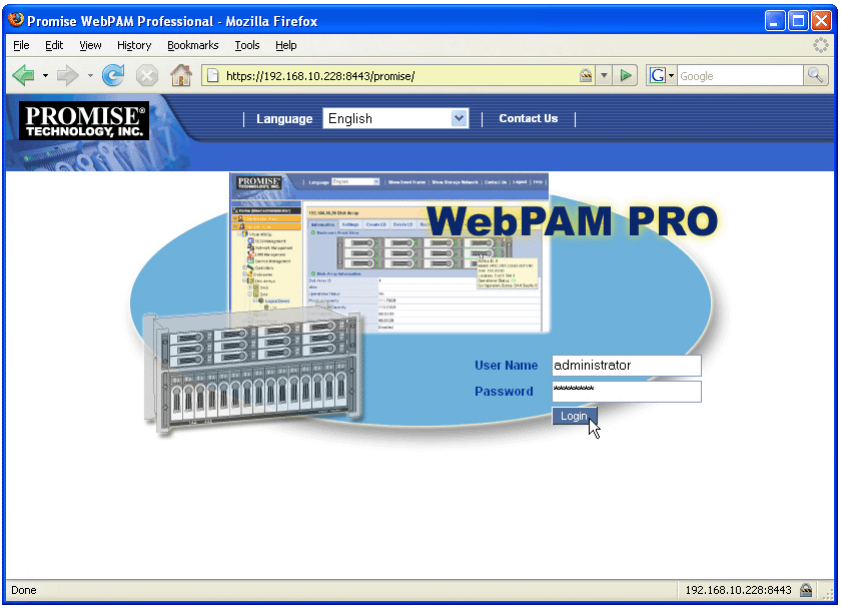
Login Screen

When the opening screen appears:

1. Type **administrator** in the User Name field.
2. Type **password** in the Password field.
3. Click the **Login** button.

   The User Name and Password are case sensitive. See Figure 1.

Figure 1. The WebPAM PRO login screen

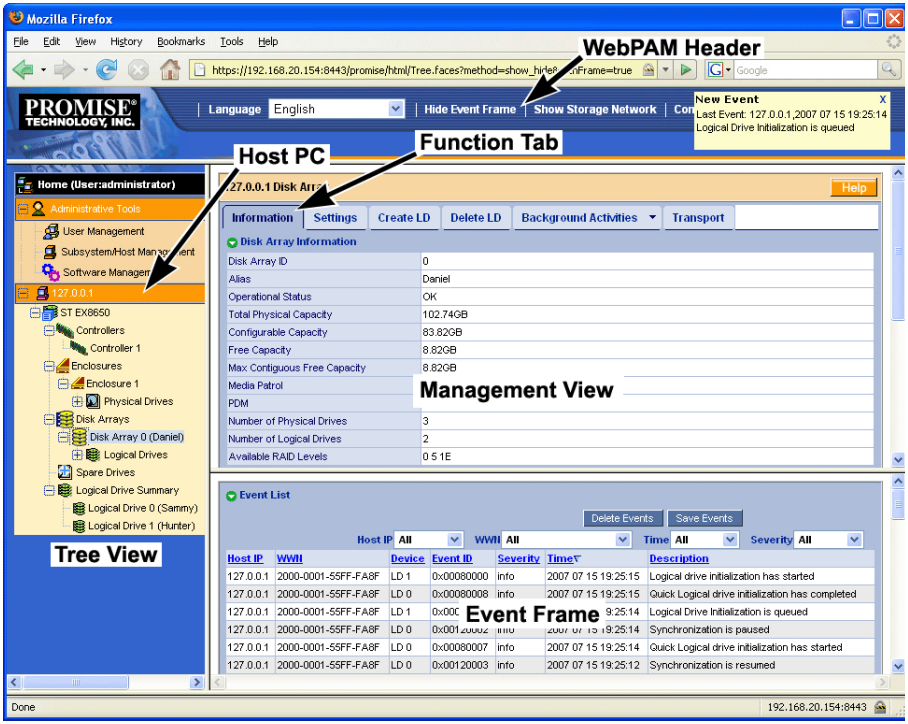


Accessing the Interface

WebPAM PRO is browser-based RAID management software with a graphic user interface. Basic user interface components and functions include:

- Using the Header (page 113)
- Using Tree View (page 113)
- Using Management View (page 114)
- Choosing a Display Language (page 115)
- Viewing the Event Frame (page 115)
- Saving the Event Frame (page 116)
- Deleting the Event Frame (page 116)
- Viewing the Storage Network (page 116)
- Logging out of WebPAM PRO (page 117)

Figure 2. WebPAM PRO interface



There are four major parts to the WebPAM PRO interface:

- Header (see page 113)
- Tree View (see page 113)
- Management View (see page 114)
- Event Frame (see page 115)

Using the Header

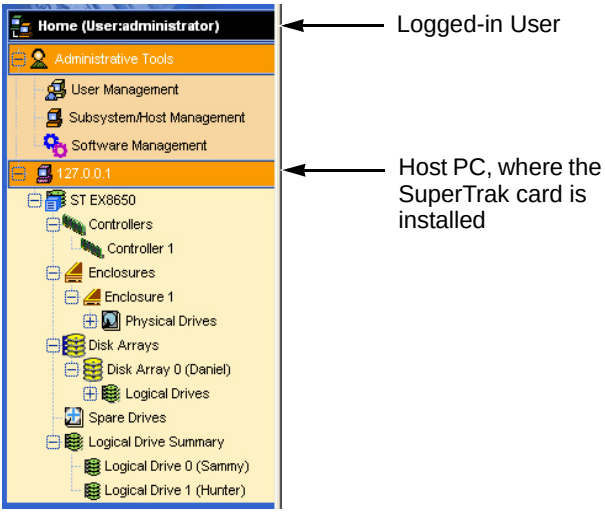
The Header contains the following items:

- **Language** – To choose a display language, see “Choosing a Display Language” on page 115.
- **Show/Hide Event Frame** – To view the Event Frame, see “Viewing the Event Frame” on page 115.
- **Show/Hide Storage Network** – To view the Storage Network, see “Viewing the Storage Network” on page 116.
- **Contact Us** – Click here for Promise Technology contact information. Or see “Contacting Technical Support” on page 277.
- **Logout** – To logout, see “Logging out of WebPAM PRO” on page 117.

Using Tree View

Tree View enables you to navigate around all components of the Host PC (where the SuperTrak controller card is installed), software management, RAID controller, enclosure, physical drives, disk arrays, logical drives, and spare drives. The figure below shows the components of Tree View.

Figure 3. WebPAM PRO Tree View



The Administrative Tools section is different for the Administrator and Super Users than for other users. The remainder of the Tree is the same for all users.

Management View displays information according to the item you choose in Tree View.

Using Management View

Management View—also referred to Management View—provides the actual user interface with the SuperTrak EX Controller card, including creation, maintenance, deletion, and monitoring of disk arrays and logical drives.

Function Tabs control specific actions and processes. This View changes depending on which item you choose in Tree View and which tab you choose in the Management View itself.

Click the **Help** button to the right of the tabs in Management View to access online help for the function that is currently displayed.

Choosing a Display Language

WebPAM PRO displays in the following languages:

- English
- Simplified Chinese
- Traditional Chinese
- French
- German
- Italian
- Japanese
- Korean
- Spanish
- Russian

To change the display language:

1. Click the **Language** dropdown menu in the Header.
2. Highlight the language you prefer.

   WebPAM PRO displays in the chosen language.

Viewing the Event Frame

To view the Event Frame, click **Show Event Frame** in the Header.

To hide the Event Frame, click **Hide Event Frame** in the Header.

The Event Frame reports all events and stores them in the WebPAM PRO folder on the hard disk drive of the Host PC.

In the event frame, events are listed and sorted by:

- **Host IP** – The IP address of the Host PC or subsystem where the event happened
- **WWN** – World Wide Number of the Host PC or subsystem where the event happened
- **Device** – Disk array, logical drive, physical drive, controller, battery, etc.
- **Event ID** – The hexadecimal number that identifies the specific type of event
- **Severity** – See below:
  - **Information** – Information only, no action is required
  - **Warning** – User can decide whether or not action is required
  - **Minor** – Action is needed but the condition is not serious at this time
  - **Major** – Action is needed now
  - **Critical** – Action is needed now and the implications of the condition are serious
  - **Fatal** – Non-Recoverable error or failure has occurred
- **Time** – Time and date of the occurrence
- **Description** – A brief description of the event

You can also view events by clicking the Subsystems icon in Tree View, then clicking the **Event** tab in Management View.

Saving the Event Frame

This function saves a copy of the events from the Event Frame as a text file on the Host PC's hard drive.

To save the event log:

1. In the Header, click **Show Event Frame**.
2. In the Event Frame, click the **Save Events** button.
3. In the File Download dialog box, click the **Save** button.
4. In the Save dialog box, name the file, navigate to the folder where you want to save the log file, and click the **Save** button.

   The event log is saved as a text file on the Host PC's hard drive.

Deleting the Event Frame

This function deletes the events from the Event Frame and from the WebPAM PRO database. Deleting the events from this point does not affect events physically stored in the HBA's or Subsystem's RAM or NVRAM.

This function has no effect upon events reported under the Subsystem icon **Events** tab. See "Viewing the Runtime Event Log" on page 134 and "Viewing the NVRAM Event Log" on page 135.

To clear the event log:

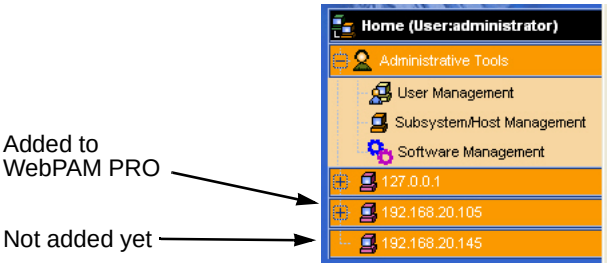
1. In the Header, click **Show Event Frame**.
2. In the Event Frame, click the **Delete Events** button.
3. In the Confirmation dialog box, type **confirm** and click the **OK** button.

Viewing the Storage Network

The Storage Network consists of all the subsystems and host PCs currently accessible on your network. Use this function to identify the subsystem or host PC you want to add.

Subsystems and host PCs already added to WebPAM PRO have a **+** icon beside them in Tree View.

Figure 4. The Storage Network appears in Tree View



To view the Storage Network, click **Show Storage Network** in the Header. All networked systems will appear in Tree View.

To hide the Storage Network, click **Hide Storage Network** in the Header. Only the networked systems you have added appear in Tree View.

See “Adding a Subsystem or Host” on page 122.

Logging out of WebPAM PRO

There are two ways to log out of WebPAM PRO:

- Close your browser window
- Click **Logout** in the WebPAM PRO Header

Figure 5. Clicking “Logout” in the Header)

Clicking **Logout** brings you back to the Login Screen. After logging out, you must enter your user name and password in order to log in again.

Managing Users

User Management deals with user accounts. Functions include:

- Viewing User Information (page 118)
- Making User Settings (page 118)
- Making Your Own User Settings (page 119)
- Changing a User's Password (page 119)
- Changing Your Own Password (page 119)
- Creating a User (page 120)
- Deleting a User (page 120)

Viewing User Information

The view a list of users, their status, access privileges, display name, and email address:

1. Click the Administrative Tools icon.
2. Click the User Management icon.

   The Information tab appears in Management View.

Making User Settings

To change settings of other users:

1. Log into WebPAM PRO as the Administrator or a Super User.
2. Click the Administrative Tools icon.
3. Click the User Management icon.
4. Click the **Information** tab in Management View.
5. In the list of users, click the **link** of the user whose settings you want to change.

   The Settings screen for the chosen user displays.
6. Enter or change the settings for this user.
   - Enable/disable this user
   - Display name
   - Privilege. See "List of User Privileges" on page 120
7. Click the **Submit** button.

The Administrator or Super User can change another user's password. See "Changing a User's Password" on page 119 for more information.

You can also set user privilege under Subsystem/Host Management. See "Setting User Privilege" on page 124 and "Setting User Rights" on page 130.

Making Your Own User Settings

To change your own user settings:

1. Log into WebPAM PRO under your own user name.
2. Click the Administrative Tools icon.
3. Click the User Management icon.
4. Click the **Settings** tab in Management View.
5. Enter or change the display name or mail address.
6. Click the **Submit** button.

Changing a User's Password

To change a user's password:

1. Log into WebPAM PRO as the Administrator or a Super User.
2. Click the Administrative Tools icon.
3. Click the User Management icon.
4. In the list of users, click the link of the user whose settings you want to change.

   The Settings screen for the chosen user displays.
5. Click the **Password** tab in Management View.
6. Enter the new password in the New Password field.
7. Enter the new password in the Retype Password field.
8. Click the **Submit** button.

Changing Your Own Password

To set or change your own password:

1. Log into WebPAM PRO under your own user name.
2. Click the Administrative Tools icon.
3. Click the User Management icon.
4. Click the **Password** tab in Management View.
5. Enter the current password in the Old Password field.

   If you do not have a password, leave this field blank.
6. Enter the new password in the New Password field.
7. Enter the new password in the Retype Password field.
8. Click the **Submit** button.

Creating a User

To create a user:

1. Log into WebPAM PRO as the Administrator or a Super User.
2. Click the Administrative Tools icon.
3. Click the User Management icon.
4. Click the **Create** tab in Management View.
5. Enter a user name in the User Name field.
6. Enter a password for this user in the New Password and Retype Password fields.

   A password is optional. If you do not assign password, tell this user to leave the password field blank when he/she logs into to WebPAM PRO. Users can set their own passwords, see “Changing Your Own Password” on page 119.
7. Check the *Enabled* box to enable this user on this subsystem.
8. Enter a display name in the Display Name field.

   A display name is optional but recommended.
9. Choose a privilege level from the Privilege dropdown menu.

   For definitions of each privilege level, see the List of User Privileges below.
10. Click the **Submit** button.

List of User Privileges

- **View** – Allows the user to see all status and settings but not to make any changes
- **Maintenance** – Allows the user to perform maintenance tasks including Rebuilding, PDM, Media Patrol, and Redundancy Check.
- **Power** – Allows the user to create (but not delete) disk arrays and logical drives, change RAID levels, change stripe size; change settings of components such as disk arrays, logical drives, physical drives, and the controller.
- **Super** – Allows the user full access to all functions including create and delete users and changing the settings of other users, and delete disk arrays and logical drives. The default “administrator” account is a Super User.

Deleting a User

There will always be at least one Super User account. You cannot delete the user account you used to log in. To delete a user:

1. Log into WebPAM PRO as the Administrator or a Super User.
2. Click the Administrative Tools icon.

3. Click the User Management icon.
4. Click the **Delete** tab in Management View.
5. Check the box to the left of the user you want to delete.
6. Click the **Submit** button.
7. Click **OK** in the confirmation box.

Working with Subsystem/Host Management

Subsystem/Host Management includes the following functions:

- Viewing Subsystem/Host Information (page 122)
- Adding a Subsystem or Host (page 122)
- Deleting a Subsystem or Host (page 123)
- Setting User Privilege (page 124)
- Updating the Firmware on Multiple Systems (page 124)

Viewing Subsystem/Host Information

To view the Subsystem/Host List:

1. Click the Administrative Tools icon in Tree View.
2. Click the Subsystem/Host Management icon.

   In the Information tab, the following information appears:

   - Subsystem/Host IP address
   - Management Port IP address
   - Health – A green checkmark means OK. A red X indicates a problem
   - Model of the RAID controller
   - Alias of the RAID controller
   - Firmware Version of the RAID controller
   - Interface of the RAID controller
   - World Wide Number of the RAID controller

   If a red X appears under Health, click the Health Information icon to display a breakdown showing the health of the controller, disk arrays, logical drives, spare drives, and physical drives.

Adding a Subsystem or Host

To add a subsystem/ or host PC to WebPAM PRO:

1. Log into WebPAM PRO as the Administrator or a Super User.
2. Click the Administrative Tools icon in Tree View.
3. Click the Subsystem/Host Management icon.
4. Click the **Add Subsystem/Host** tab in Management View.

5. Do one of the following actions:
   - To create an in-band connection: Type the *Host PC's* IP address into the address field.

     Choose this option for *SuperTrak*. Note that entries such as *localhost* or the Host PC's network name do not work for this function.
   - To create an out-of-band connection: Type the *Subsystem's* management port IP address into the address field.
6. Click the **Submit** button.

   The new Subsystem or Host PC is added to Tree View.

In-Band versus Out-of-Band

In-band connection

- The WebPAM PRO Agent is running on the *Host PC* or *server*.
- The WebPAM PRO Client/Server is running on *any PC* on the network.
- Management commands to a subsystem travel through the subsystem's *data* ports.
- *Multiple* subsystems can appear under the same Host PC or server.

Out-of-band connection

- The WebPAM PRO Agent is running on the *subsystem*.
- The WebPAM PRO Client/Server is running on the *same Host PC* on the network.
- Management commands to a subsystem travel through the subsystem's *management* port.
- *Only one* subsystem can appear under a Host PC or server.

Deleting a Subsystem or Host

When you delete a subsystem or host PC, you only remove it from WebPAM PRO's list of monitored systems. This action has no effect upon the disk arrays, logical drives, or data stored on the RAID.

To delete a subsystem or host PC:

1. Log into WebPAM PRO as the Administrator or a Super User.
2. Click the Administrative Tools icon in Tree View.
3. Click the Subsystem/Host Management icon.
4. Click the **Delete Subsystem/Host** tab in Management View.
5. Check the box to the left of the subsystem or host PC you want to delete.
6. Click the **Submit** button.

7. In the confirmation box, type the word **confirm** in the field provided.
8. Click the **OK** button.

Setting User Privilege

To set user privilege:

1. Click the Administrative Tools icon in Tree View.
2. Click the Subsystem/Host Management icon.
3. Click the IP address link of the Subsystem or Host you want to access.
4. Beside the name of the user whose privilege you want to change, choose the privilege level from the Privilege dropdown menu.

   For definitions of each privilege level, see “List of User Privileges” on page 120.
5. Click the **Submit** button.

You can also set user privilege under User settings. See “Making User Settings” on page 118.

Updating the Firmware on Multiple Systems

Cautions

- Before you begin, backup any important or useful data.
- Do NOT power off your PC during the procedure.

Use this function to update the firmware and BIOS on SuperTrak controllers in multiple Host PCs at the same time.

You must first download the update file and save it to the Host PC. See “Downloading BIOS and Firmware File” on page 289.

Note that this function does not update the software *driver*. Install the software driver file following the procedure for your operating system. See “Chapter 3: Installing Drivers” on page 63.

You can also update the firmware on:

- An individual SuperTrak controller
- A VTrak JBOD enclosure

See “Updating the Firmware” on page 132.

To update the SuperTrak firmware on multiple Host PCs:

1. Click the Administrative Tools icon in Tree View.
2. Click the Subsystem/Host Management icon.

3. In Management View, click the **Multiple Firmware Update** tab dropdown menu and choose *Multiple HBA Firmware Update*.
4. From the Subsystem/Host List, check the box beside the Host PCs with the SuperTrak controllers you want to update.
5. Choose the *Download Flash File from Local File through HTTP* option and click the **Next** button.
6. Click the **Browse** button and navigate to the directory where you saved the update file, then click the update file, and click the **Open** button.
7. Click the **Start** button.

   When the Flash Image Status shows *Flash image completed*, the firmware and BIOS have been updated.
8. Restart the Host PCs.

Managing Software Services

Software Services include the following functions:

- Viewing Service Status (page 126)
- Changing Web Server Settings (page 126)
- Restarting the Tomcat Server (page 127)
- Setting up Email Service (page 127)
- Setting up Extended SMTP (page 128)
- Setting Event Frame Refresh Time (page 128)
- Changing CIM Client Settings (page 129)
- Changing CIM Server Settings (page 129)

Viewing Service Status

There are two software services: Web Server and Email. There are no user settings. To view the status of the software services:

1. Click the Administrative Tools icon in Tree View.
2. Click the Software Management icon.

   The service name, startup type, and current status appear under the **Service** tab.

Changing Web Server Settings

To change the Web Server settings:

1. Click the Administrative Tools icon in Tree View.
2. Click the Software Management icon.
3. Click the **Web Server** tab in Management View.
4. Do one of the following actions:
   - For a regular connection:

     In the HTTP Port field, type the HTTP port number. The default is 8080.
   - For a secure connection:

     Check the Enable SSL box.

     In the HTTPS Port field, type the HTTPS port number. The default is 8443.
5. In the Session Time Out field, enter a time value in minutes.

   The range is 1 to 1440 minutes. 15 minutes is the default.

Session Time Out refers to the amount of time the connection remains active without any user interaction. After WebPAM PRO reaches the Time Out interval, you must log in again and begin a new session.

6. Click the **Submit** button.
7. In the confirmation box, type the word **confirm** in the field provided.
8. Click the **OK** button.

Restarting the Tomcat Server

After you change the Web Server port number, you must restart the Tomcat server on the Host PC.

Windows

In the Start menu, choose Programs > WebPAM PRO > Server > Restart.

Linux

1. Open a terminal window.
2. Go to the server folder.

   ```
   cd /opt/Promise/WebPAMPRO/Server
   ```

3. Run the restart command:

   ```
   sh restartPromiseWebPamPro.sh
   ```

   The system returns:

   ```
   /etc/rc.d/init.d/ exists.
   Shutting down: tomcat OK
   Starting: tomcat OK
   ```

   (Or a similar message)

Setting up Email Service

To change the Email settings:

1. Click the Administrative Tools icon in Tree View.
2. Click the Software Management icon.
3. Click the **Email** tab in Management View.
4. Enter an Email sender address (example: RAIDmaster@mycompany.com) in the field provided.
5. Enter an Email server IP address in the field provided.
6. Enter an Email subject (example: VTrak Status) in the field provided.
7. When you are done, click the **Submit** button.

Setting up Extended SMTP

To make Extended SMTP settings:

1. Click the Administrative Tools icon in Tree View.
2. Click the Software Management icon.
3. Click the **Email** tab in Management View.
4. Check the *Enable ESMTP* box to enable ESMTP.
   Uncheck the box to disable ESMTP.
5. Enter ESMTP user name in the field provided.
6. Enter a ESMTP password in the field provided.
7. When you are done, click the **Submit** button.

Sending A Test Email Message

Before you can send a test message, your email service must be set up as described in “Setting up Email Service” on page 127.

To send a test email message:

1. Click the Administrative Tools icon in Tree View.
2. Click the Software Management icon.
3. Click the **Email** tab in Management View.
4. Click the **Test Email** button.
   A new window opens.
5. Type the recipient's email address in the field provided.
6. Click the **Submit** button.
   WebPAM PRO sends a test email message to the address you specified.

Setting Event Frame Refresh Time

To set the refresh time for the Event Frame:

1. Click the Administrative Tools icon in Tree View.
2. Click the Software Management icon.
3. Click the **Refresh time** tab.
4. Choose a time interval from the Event Refresh Time dropdown menu.
   The choices are *15*, *30*, *60*, and *300* seconds.
5. Click the **Submit** button.

Changing CIM Client Settings

The CIM client is part of the WebPAM PRO Utility Server. The Utility Server can be installed on any PC on the network. Only one CIM client and Utility Server installation is required.

The CIM client works with CIM server. The CIM server is part of the WebPAMPRO Agent. The Agent must be installed on every host PC where the HBA RAID controller is installed to enable management over a network.

Under most conditions, there is no need to change CIM settings.

To change settings for the CIM client:

1. Click the Administrative Tools icon in Tree View.
2. Click the Software Management icon.
3. Click the **CIM Settings** tab.
4. Type the user name in the CIM User name field.
   The default name is “cim”.
5. Type a password into the CIM User Password field.
   The default password is “password”.
6. Click the **Submit** button.

Important

If you change CIM client settings, you must make matching CIM server settings on ALL Host PCs, otherwise WebPAM PRO will be unable to monitor them.

Be sure you change the CIM server settings on ALL of your Host PCs to match the CIM client settings.

Changing CIM Server Settings

To change settings for the CIM server:

1. On the Host PC, access the WebPAM PRO agent folder.
   - **Windows** – C:/Program Files/WebPAMPRO/Agent/bin
   - **Linux** – /opt/WebPAMPRO/Agent/bin
2. Open a command prompt, type **cimuser --help** and press Enter.
3. Follow the instructions on the screen.

Managing the Host

The Host is designated by its IP address:127.0.0.1. Host functions include:

- Viewing Host Information (page 130)
- Setting User Rights (page 130)
- Refreshing the WebPAM PRO Screen (page 130)

Viewing Host Information

To view Host information, click the 127.0.0.1 icon in Tree View. In the Information tab, the following information appears:

- Management Port IP address (refers to the Host PC)
- Model of the RAID controller
- Alias of the RAID controller
- Firmware Version of the RAID controller
- Interface of the RAID controller
- World Wide Number of the RAID controller

Setting User Rights

User rights is the same function as user privilege. To set user rights:

1. Click the 127.0.0.1 icon in Tree View.
2. Click the **User Rights** tab.
3. Beside the name of the user whose privilege you want to change, choose the privilege level from the Privilege dropdown menu.

   For definitions of each privilege level, see “List of User Privileges” on page 120.
4. Click the **Submit** button.

You can also set user privilege under User settings. See “Making User Settings” on page 118

Refreshing the WebPAM PRO Screen

Unlike clicking browser’s refresh button, this function calls new information from the RAID controller’s firmware to update the screen. To refresh the screen:

1. Click the 127.0.0.1 icon in Tree View.
2. Click the **Refresh** tab.
3. Click the **Submit** button.
4. Click the **OK** button in the confirmation box.

Managing the Subsystem

Subsystem functions include:

- Viewing Subsystem Information (page 131)
- Clearing Statistical Data (page 132)
- Setting an Alias for the Subsystem (page 132)
- Viewing the Runtime Event Log (page 134)
- Saving the Runtime Event Log (page 134)
- Clearing the Runtime Event Log (page 135)
- Viewing the NVRAM Event Log (page 135)
- Saving the NVRAM Event Log (page 136)
- Clearing the NVRAM Event Log (page 136)
- Updating the Firmware (page 132)
- Checking Subsystem Health (page 133)
- Viewing the NVRAM Event Log (page 135)
- Viewing Current Background Activities (page 136)
- Making Background Activity Settings (page 137)
- Running Background Activities (page 138)
- Running Media Patrol (page 138)
- Running PDM (page 138)
- Viewing Scheduled Activities (page 139)
- Scheduling an Activity (page 139)
- Deleting a Scheduled Activity (page 141)
- Viewing System Configuration (page 141)

Viewing Subsystem Information

To view information about a subsystem, click the Subsystem icon in Tree View. Management View displays the subsystem information.

To view information about the Host PC, users, controllers, schedules, activities, physical drives, disk arrays, and logical drives, see “Viewing System Configuration” on page 141.

Clearing Statistical Data

Use this function to clear the statistical data registers for the controller, physical drives, and logical drives.

To clear statistical data:

1. In Tree View, click the Subsystem icon.
2. In Management View, click the **Information** tab.
3. Click the **Clear Statistics** link.
4. Click the **Submit** button.
5. In the Confirmation dialog box, type **confirm** and click the **OK** button.

Setting an Alias for the Subsystem

An alias is optional. To set an alias for this subsystem or host:

1. In Tree View, click the Subsystem icon.
2. In Management View, click the **Settings** tab.
3. Enter a name into the Alias field.

   Maximum of 48 characters. Use letters, numbers, one space between words, and underscore.
4. Click the **Submit** button.

Updating the Firmware

Cautions

- Before you begin, backup any important or useful data.
- Do NOT power off your PC during the procedure.

Use this function to update:

- Firmware and BIOS on a SuperTrak controller card
- Firmware on a VTrak JBOD enclosure

You must first download the update file and save it to the Host PC. See “Downloading BIOS and Firmware File” on page 289.

Note that this function does not update the software *driver*. Install the software driver file following the procedure for your operating system. See “Chapter 3: Installing Drivers” on page 63.

You can also update the firmware on the SuperTrak controllers in multiple Host PCs at the same time. See “Updating the Firmware on Multiple Systems” on page 124.

SuperTrak Controller Card

To upgrade the firmware on a SuperTrak Controller Card:

1. In Tree View, click the Subsystem icon.
2. From the **Firmware Update** tab, choose *Controller Firmware Update*.
3. Choose the *Download Flash File from Local File through HTTP* option and click the **Next** button.
4. Click the **Browse** button.
5. Navigate to the directory where you saved the update file, then click the update file, and click the **Open** button.
6. Click the **Submit** button.

   When the Flash Image Status shows *Flash image completed*, the firmware and BIOS have been updated.
7. Restart the Host PC.

VTrak JBOD Enclosure

To upgrade the firmware on an attached VTrak JBOD enclosure:

1. In Tree View, click the Subsystem icon.
2. From the **Firmware Update** tab, choose *JBOD Firmware Update*.
3. Click the **Browse** button.
4. Navigate to the directory where you saved the update file, then click the update file, and click the **Open** button.
5. Click the **Submit** button.

   When the Flash Image Status shows *Flash image completed*, the firmware has been updated.
6. Shut down the Host PC.
7. Power cycle the VTrak enclosures.

   Turn OFF both power supply switches. Wait 30 seconds. Turn ON both power supply switches. Do this action for all attached VTrak enclosures.
8. Boot the Host PC.

Checking Subsystem Health

1. In Tree View, click the Subsystem icon.
2. In Management View, click the **Health** tab.

   The health or status of following items is displayed:
   - Controller
   - Disk Array
   - Logical Drive

- Spare Drive
- Physical Drive

If any item reports other than “OK” click that item in the Tree to investigate the cause of the problem.

Viewing the Runtime Event Log

Runtime Events lists information about all events recorded since the system was started. Runtime events are stored in RAM on the RAID controller. These events are cleared when you reboot your system.

To view runtime events:

1. In Tree View, click the Subsystem icon.
2. From the dropdown menu on the **Event** tab, choose *Runtime Events*.

   The events are listed from newest at the top of the list to oldest at the bottom.

Severity Definitions

Each event is marked with a level of severity.

- **Information** – Information only, no action is required
- **Warning** – User can decide whether or not action is required
- **Minor** – Action is needed but the condition is not serious at this time
- **Major** – Action is needed now
- **Critical** – Action is needed now and the implications of the condition are serious
- **Fatal** – Non-Recoverable error or failure has occurred

Saving the Runtime Event Log

This function saves a copy of the runtime event log as a text file on the Host PC’s hard drive.

To save the runtime event log:

1. In Tree View, click the Subsystem icon.
2. From the dropdown menu on the **Event** tab, choose *Runtime Events*.
3. At the bottom of the window, click the **Save Event Log** button.
4. In the File Download dialog box, click the **Save** button.
5. In the Save dialog box, name the file, navigate to the folder where you want to save the log file, and click the **Save** button.

   A text file of the event log is saved to the Host PC’s hard drive.

Clearing the Runtime Event Log

This function clears the events from the runtime event log screen and from the RAM on the RAID controller. This function has no effect upon events reported in the WebPAM PRO Event Frame. “Viewing the Event Frame” on page 115.

To clear the runtime event log:

1. In Tree View, click the Subsystem icon.
2. From the dropdown menu on the **Event** tab, choose *Runtime Events*.
3. At the bottom of the window, click the **Clear Event Log** button.
4. In the Confirmation dialog box, type **confirm** and click the **OK** button.

   All events are cleared from the screen and the RAID controller’s RAM.

Viewing the NVRAM Event Log

NVRAM Events lists information about the most recent important or critical events. NVRAM events are stored in non-volatile memory on the RAID controller. This information persists even if you reboot your system.

To view runtime events:

1. In Tree View, click the Subsystem icon.
2. From the dropdown menu on the **Event** tab, choose *NVRAM Events*.

   The events are listed from newest at the top of the list to oldest at the bottom.

Severity Definitions

Each event is marked with a level of severity.

- **Information** – Information only, no action is required
- **Warning** – User can decide whether or not action is required
- **Minor** – Action is needed but the condition is not serious at this time
- **Major** – Action is needed now
- **Critical** – Action is needed now and the implications of the condition are serious
- **Fatal** – Non-Recoverable error or failure has occurred

Saving the NVRAM Event Log

This function saves a copy of the NVRAM event log as a text file on the Host PC's hard drive.

To save the NVRAM event log:

1. In Tree View, click the Subsystem icon.
2. From the dropdown menu on the **Event** tab, choose *NVRAM Events*.
3. At the bottom of the window, click the **Save Event Log** button.
4. In the File Download dialog box, click the **Save** button.
5. In the Save dialog box, name the file, navigate to the folder where you want to save the log file, and click the **Save** button.

   A text file of the event log is saved to the Host PC's hard drive.

Clearing the NVRAM Event Log

This function clears the events from the NVRAM event log screen and from the NVRAM on the RAID controller. This function has no effect upon events reported in the WebPAM PRO Event Frame. "Viewing the Event Frame" on page 115.

To clear the NVRAM event log:

1. In Tree View, click the Subsystem icon.
2. From the dropdown menu on the **Event** tab, choose *NVRAM Events*.
3. At the bottom of the window, click the **Clear Event Log** button.
4. In the Confirmation dialog box, type **confirm** and click the **OK** button.

   All events are cleared from the screen and the RAID controller's non-volatile RAM.

Viewing Current Background Activities

To view the current background activities:

1. Click the Subsystem icon in Tree View.
2. Click the **Background Activities** tab in Management View.

   A list of current background activities appears, including:

   - Rebuild
   - PDM – Predictive Data Migration
   - Synchronization
   - Redundancy Check
   - Migration
   - Transition

- Initialization
- Media Patrol

Making Background Activity Settings

To make settings for background activities:

1. In Tree View, click the Subsystem icon.
2. From the dropdown menu on the **Background Activities** tab, choose *Settings*.
3. Click the dropdown menu to choose a priority of *Low*, *Medium*, or *High* for the following functions:
   - **Rebuild** – Rebuilds the data from a failed drive in a disk array
   - **Synchronization** – Checks the data integrity on disk arrays
   - **Initialization** – Sets all data bits in the logical drive to zero
   - **Redundancy Check** – Checks, reports and can correct data inconsistencies in logical drives
   - **Migration** – Change RAID level or add physical dries to disk arrays
   - **PDM** – Looks for bad blocks the physical drives of disk arrays
   - **Transition** – Returns a revertible spare drive to spare status

   The rates are defined as follows:
   - **Low** – Fewer resources to activity, more to data read/write.
   - **Medium** – Balance of resources to activity and data read/write.
   - **High** – More resources to activity, fewer to data read/write.
4. Highlight the following PDM trigger settings and type a value into the corresponding field:
   - **Reassigned Block Threshold** – 1 to 512 blocks
   - **Error Block Threshold** – 1 to 1024 blocks
5. Check to enable or uncheck to disable the following functions:
   - **Media Patrol** – Checks the magnetic media on physical drives
   - **Auto Rebuild** – This function applies to conditions when an array goes Critical but no spare drive is present. When enabled, the disk array will begin to rebuild as soon as you replace the failed physical drive with an unconfigured physical drive of equal or greater size.

     For conditions when an array goes Critical and a spare drive of adequate size is present, a rebuild begins automatically. This is a separate function and always enabled.
6. Click the **Submit** button to save your settings.

Running Background Activities

To run a background activity from the Background Activities tab:

1. In Tree View, click the Subsystem icon.
2. From the dropdown menu on the **Background Activities** tab, choose one of the following activities:
   - **Media Patrol** – See “Running Media Patrol” on page 138
   - **Rebuild** – See “Rebuilding a Disk Array” on page 168
   - **PDM** – See “Running PDM” on page 138
   - **Transition** – See “Transitioning a Disk Array” on page 170
   - **Initialization** – See “Initializing a Logical Drive” on page 175
   - **Redundancy Check** – See “Running Redundancy Check” on page 176
3. In the next screen, make the choices as requested.
4. Click the **Start** button.

Running Media Patrol

Media Patrol checks the magnetic media on physical drives. When it finds the specified number of bad blocks, it will trigger PDM. See “Making Background Activity Settings” on page 137 and “Running PDM” on page 138.

You can schedule Media Patrol to run automatically, see “Scheduling an Activity” on page 139.

To run Media Patrol:

1. In Tree View, click the Subsystem icon.
2. From the dropdown menu on the **Background Activities** tab, choose *Start Media Patrol*.
3. In the next screen, click the **Start** button.

Running PDM

Predictive Data Migration (PDM) migrates data from the suspect physical drive to a spare disk drive, similar to Rebuilding. But unlike Rebuilding, PDM acts *before* the disk drive fails and your Logical Drive goes Critical.

You an also run PDM on a specific disk array, see “Running PDM on a Disk Array” on page 169.

The target physical drive must be the same media type, HDD or SDD, as the other physical drives in the disk array.

Also see “Predictive Data Migration (PDM)” on page 255.

To run PDM:

1. In Tree View, click the Subsystem icon.
2. From the dropdown menu on the **Background Activities** tab, choose *Start PDM*.
3. In the next screen, choose the *Source* and *Target* physical drives.

   The suspect physical drive is the Source.

   The replacement physical drive is the Target.
4. Click the **Start** button.

Viewing Scheduled Activities

To view scheduled activities for this subsystem:

1. Click the Subsystem icon Tree View.
2. Click the **Scheduler** tab in Management View.

Scheduling an Activity

To set a scheduled activity for this subsystem:

1. Click the Subsystem icon Tree View.
2. From the dropdown menu on the **Scheduler** tab, choose *Add BGA Scheduler*.
3. Click the option button of the activity you want:
   - Media Patrol. See “Running Media Patrol” on page 138
   - Redundancy Check. See “Running Redundancy Check” on page 176
   - Spare Check. See “Running Spare Check” on page 181
4. In the Scheduler dialog box, check the *Enable This Schedule* box.
5. Click the option button for the Recurrence Pattern you want:
   - Daily
   - Weekly
   - Monthly
6. Click the **Next** button.
7. For a DAILY recurrence pattern, make the following setting:
   - Choose a Start Time for the activity, based on a 24-hour clock, from the dropdown menus.
   - Type the number of days between activities, from 1 to 255, into the Every days field.

For a WEEKLY recurrence pattern, make the following settings:

- Choose a Start Time for the activity, based on a 24-hour clock, from the dropdown menus.
- Type the number of weeks between activities, from 1 to 52, into the Every weeks field.
- Check the boxes for the days of the week you want the activity to run.

  You can choose from 1 to 7 days.

For a MONTHLY recurrence pattern, make the following settings:

- Choose a Start Time for the activity, based on a 24-hour clock, from the dropdown menus.
- Choose the day of the month:
  - Choose a day of the month, 1 to 31, from the dropdown menu. See the Note below.
  - Choose a day of the month, first to last, and day of the week, from the dropdown menus.
- Check the boxes for the months of the year you want the activity to run.

  You can choose from 1 to 12 months.

8. Choose a starting date in the Start From dropdown menus.

   The default is today's date.
9. Choose an End On option:
   - No end date (recommended).
   - End After the specified number of activities. Type the number of activities, from 1 to 255, into the field provided.
   - Until a specified date. Choose an end date from the dropdown menus.

     The default is today’s date.
10. For Redundancy Check only:
    - Choose the Auto Fix option. This feature attempts to repair the problem when it finds an error.
    - Choose the Pause on Error option. This feature stops the process when it finds an error
    - Check the boxes beside the logical drives (all except RAID 0) to which this activity will apply.

      Note: Each logical drive can have only one scheduled Redundancy Check.
11. Click the **Submit** button.

Note

For monthly schedules, if you choose a higher number than a month has days, the activity will occur in the following month. For example, say you choose day 31. But there are only 30 days in the month of June. Therefore, the June activity will happen on July 1. The next activity will happen on July 31.

Deleting a Scheduled Activity

To delete a scheduled activity for this subsystem:

1. Click the Subsystem icon Tree View.
2. From the dropdown menu on the **Scheduler** tab, choose *Delete Schedules*.
3. Check the box to the left of the schedule you want to delete.
4. Click the **Submit** button.

Viewing System Configuration

To view the configuration of your complete system:

1. Click the Subsystem icon Tree View.
2. Click the **Configuration** tab in Management View.

   The following information is displayed:

   - **Host Information** – WebPAM PRO version, host name and IP address, OS version, and JVM version
   - **User List** – User name, status, and display name
   - **Controllers Summary** – Alias, model, and operational status
   - **Scheduled Activities List** – Type, recurrence, start time, and operational status
   - **Enclosures Summary** – ID, type, operational status, and description
   - **Physical Drive List** – Device number, model, type, capacity, location, operational status, and configuration
   - **Disk Array List** – ID, alias, operational status, configurable capacity, and free capacity
   - **Logical Drive List** – Device number, alias, RAID level, capacity, ID, stripe size, sector size, and operational status
   - **Spare Drive List** – ID, operational status, physical drive ID, capacity, revertibility, type (global or dedicated), and dedicated to array

Managing the Controller

The RAID controller is the heart of the RAID storage system. Management of Controllers includes the following functions:

- Viewing Controllers Information (page 142)
- Viewing Controller Information (page 142)
- Viewing Controller Statistics (page 144)
- Making Controller Settings (page 144)
- Clearing an Orphan Watermark (page 145)
- Viewing Battery Information (page 145)
- Silencing the Buzzer (page 146)
- Making Buzzer Settings (page 146)
- Testing the Buzzer (page 146)
- Viewing Buzzer Information (page 147)

Viewing Controllers Information

Controllers information refers to a brief summary about the controller. To view Controller information:

1. Click the Subsystem icon in Tree View.
2. Click the Controllers icon.

   The controllers information appears under the Information tab in Management View. Controllers information includes:

   - Controller ID
   - Alias, if assigned
   - Model of the RAID controller
   - Status of the RAID controller – OK means normal

Viewing Controller Information

Controller information refers to detailed information about the controller. To view Controller information:

1. Click the Subsystem icon in Tree View.
2. Click the Controllers icon.
3. Click the Controller icon.

   The controller information appears under the Information tab in Management View. Controller information includes:

   - Controller ID (1 or 2)

- Alias, if assigned*
- Vendor
- Model
- Operational Status
- Power On Time
- Cache Usage (percent)
- Dirty Cache Usage (percent) – Refers to data in the cache that is not yet saved to a physical drive
- Part number
- Serial number
- Hardware revision number
- WWN – World Wide Number of the controller
- Manufacturing Date
- SCSI protocols supported
- Host Driver Version
- BIOS Version
- Single Image Version
- Single Image Build Date
- The Host driver is installed and updated through your operating system. You can update the other items automatically. See “Updating the Firmware” on page 132.
- Advanced controller information includes:
- Memory Type – Controller’s data cache.
- Memory Size
- Flash Type – Stores firmware, software and user configurations.
- Flash Size
- NVRAM Type – Stores parameters, settings and tables.
- NVRAM Size
- Preferred Cache Line Size
- Cache Line Size
- Coercion*
- Coercion Method*
- SMART* – Self-Monitoring, Analysis and Reporting System for physical drives

Controller information, continued:

- SMART Polling Interval*

- Write Back Cache Flush Interval*
- Write Through Mode
- Enclosure Polling interval*
- Adaptive Writeback Cache*

Items marked with an asterisk (*) are user adjustable. See “Making Controller Settings” on page 144.

Viewing Controller Statistics

To view controller statistics:

1. Click the Subsystem icon in Tree View.
2. Click the Controllers icon.
3. Click the Controller icon.
4. From the dropdown menu on the **Information** tab, choose *Statistics*.

Making Controller Settings

To make Controller settings:

1. Click the Subsystem icon in Tree View.
2. Click the Controllers icon.
3. Click the Controller icon.
4. Click the **Settings** tab in Management View.
5. Make the following settings as needed:
   - Optional. Enter a name into the Alias field.

     Maximum of 48 characters. Use letters, numbers, one space between words, and underscore. An alias is not required.
   - Check the *SMART Log* box to enable the Self-Monitoring, Analysis, and Reporting System (SMART).
   - Enter a polling interval (1 to 1440 minutes) in SMART Polling Interval field.
   - Check the *Coercion Enabled* box to enable disk drive capacity coercion.
   - Choose a coercion method from the Coercion Method dropdown menu. The choices are:
     - *GBTruncate*
     - *10GBTruncate*
     - *GRPRounding*
     - *TableRounding*

For more information, see “Capacity Coercion” on page 246.

- Enter a time interval (1 to 12 seconds) in the Write Back Cache Flush Interval field.
- Enter a time interval (15 to 255 seconds) in the Enclosure Polling Interval field.

  This is the time interval in which the controller polls all of the components in the enclosure.
- Check the box to enable Adaptive Writeback Cache
- Check the box to enable Forced Read Ahead Cache

  For more information, see “Choosing Cache Policy” on page 245.

6. Click the **Submit** button.

   The changes take effect immediately.

Clearing an Orphan Watermark

An Orphan Watermark condition is the result of a disk drive failure during an NVRAM RAID level migration on a disk array. The Clear tab remains grayed out unless this condition is present.

To clear an orphan watermark:

1. Click the Subsystem icon in Tree View.
2. Click the Controllers icon.
3. Click the Controller icon.
4. Click the **Clear** tab in Management View.
5. Click the **Submit** button.

   The change takes effect immediately.

Viewing Battery Information

The RAID controller’s cache backup battery protects data in the cache for up to 72 hours in the event of a power failure.

To view battery information:

1. Click the Subsystem icon in Tree View.
2. Click the Controllers icon.
3. Click the Controller icon.
4. Click the **Battery** tab in Management View.

In normal operation, the operational status of the battery shows Fully Charged with a Reserve Capacity of 100%. If the battery is constantly recharging, its

reserve capacity drops significantly, or the battery remains discharged, replace the battery. Also see “Viewing Enclosure Information” on page 148.

Silencing the Buzzer

To silence the buzzer for the current event:

1. Click the Subsystem icon in Tree View.
2. Click the Controllers icon.
3. Click the Controller icon.
4. Click the **Buzzer** tab in Management View.
5. Click the **Mute** button.

   The buzzer goes silent but will sound again for future events.

Making Buzzer Settings

To make buzzer settings:

1. Click the Subsystem icon in Tree View.
2. Click the Controllers icon.
3. Click the Controller icon.
4. From the dropdown menu on the **Buzzer** tab, choose *Settings*.
5. Check the *Enable Buzzer* box to enable the buzzer.

   Uncheck the box to disable the buzzer.
6. Click the **Submit** button

   The changes take effect immediately.

Testing the Buzzer

You must enable the buzzer before you can test it. See “Making Buzzer Settings,” above.

To test the buzzer:

1. Click the Subsystem icon in Tree View.
2. Click the Controllers icon.
3. Click the Controller icon.
4. Click the **Buzzer** tab in Management View.
5. Click the **Sound** button.

   The buzzer sounds a continuous tone.
6. Click the **Mute** button.

The buzzer goes silent but remains enabled.

Viewing Buzzer Information

This function refers to the buzzer on the SuperTrak RAID controller card.

To view buzzer information:

1. Click the Subsystem icon in Tree View.
2. Click the Controllers icon.
3. Click the Controller icon.
4. Click the **Buzzer** tab in Management View.

Managing Enclosures

This function of WebPAM PRO does not apply to the SuperTrak RAID controller card installed in a Host PC, except for one item:

- Viewing Enclosure Information (page 148)

Viewing Enclosure Information

Enclosure information includes:

- Enclosure ID
- Enclosure Type – Virtual
- SEP Firmware Version
- Maximum number of Controllers, Physical Drive Slots, Fans, Blowers, Temperature Sensors, Power Supply Units, Batteries, and Voltage Sensors.

This information might be useful when contacting Technical Support.

To view Enclosure information:

1. Click the Subsystem icon in Tree View.
2. Click the Enclosures icon.
3. Click the Enclosure icon.

   The Enclosure information appears on the Information tab.

See the following topics:

- “SAS Connections and ID Numbers” on page 15
- “Viewing Controller Information” on page 142
- “Viewing Battery Information” on page 145
- “Contacting Technical Support” on page 277.

Note

In addition to the SuperTrak EX Series, WebPAM PRO also supports Promise VTrak RAID Subsystems.

For more information about managing those products with WebPAM PRO, see the online help or refer to the Subsystem’s *Product Manual.*

Managing Physical Drives

Managing Physical Drives deals with the physical disk drives under the SuperTrak RAID controller, including the following functions:

- Viewing a List of Physical Drives (page 149)
- Locating a Physical Drive (page 149)
- Making Global Physical Drive Settings (page 150)
- Viewing Physical Drive Information (page 151)
- Viewing Physical Drive Statistics (page 151)
- Making Physical Drive Settings (page 152)
- Clearing Stale and PFA Conditions (page 152)
- Viewing the SMART Log (page 153)
- Viewing Advanced SMART Log Information (page 154)
- Saving Advanced SMART Log Information (page 155)
- Making SMART Log Settings (page 155)

Viewing a List of Physical Drives

To view a list of physical drives in this enclosure:

1. Click the Subsystem icon in Tree View.
2. Click the Enclosures icon.
3. Click the Enclosure icon.
4. Click the Physical Drives icon.

   The list of physical drives appears in Management View.

   Click the **PD** link to view a specific physical drive. See “Viewing Physical Drive Information” on page 151.

   Note that Enclosure and Slot numbers are assigned by the controller and do not necessarily correspond to the actual physical locations of the disk drives, especially when the disk drives are installed in an enclosure not designed by Promise.

   Also see “SAS Connections and ID Numbers” on page 15.

Locating a Physical Drive

Virtual or Third Party Enclosures

Support for this feature depends on how your system or enclosure was set up. Direct-connect systems with individual LED connections and SGPIO enclosures support individual physical drive LEDs. Other systems or enclosures might or

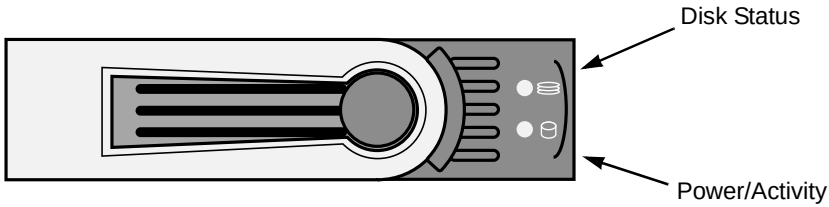
might not support them. See “Appendix D: LED Backplane Connections” on page 295.

To locate a physical drive in the enclosure, click the **Locate PDx** button. The LED for the carrier holding the physical drive will blink for one minute.

Promise Enclosures

To locate a physical drive in the VTrak JBOD enclosure, click the Locate PDx button. The disk status LED will blink for one minute to identify the carrier holding the physical drive.

Figure 6. VTrak drive carrier LEDs



Making Global Physical Drive Settings

Global settings apply to all of the physical disk drives installed under the SuperTrak controller. The functions include:

SATA Drives	SAS Drives
• Enable Write Cache	• Enable Write Cache
• Enable Read Look Ahead Cache	• Enable Read Look Ahead Cache
• Enable Command Queuing	• Enable Read Cache

To make global physical drive settings:

1. Click the Subsystem icon in Tree View.
2. Click the Enclosures icon.
3. Click the Enclosure icon.
4. Click the Physical Drives icon.
5. Click the **Global Settings** tab in Management View.
6. Check the features you want to enable.
   Uncheck any features you want to disable.
7. Click the **Submit** button.
   The changes take effect immediately.

The functions you enable here depend on whether the physical drives support those functions. See “Viewing Physical Drive Information” on page 151 to determine which functions a particular drive supports.

Viewing Physical Drive Information

To view physical drive information:

1. Click the Subsystem icon in Tree View.
2. Click the Enclosures icon.
3. Click the Enclosure icon.
4. Click the Physical Drives icon.
5. Click a Physical Drive icon.

Useful information provided here includes:

- **Operational Status** – OK is normal. Can also show Rebuilding, Forced Online, Forced Offline, Transition Running, PDM Running, Media Patrol Running, Stale, PFA, Offline or Dead.
- **Configuration Status** – The array to which the drive is assigned or its spare designation, including Unconfigured, Stale, PFA, Global Spare, Dedicated Spare, Revertible Global Spare, Revertible Dedicated Spare.

Adjustable Items

- **Write Cache** – Enabled or disabled as chosen on the Physical Drives Settings tab.
- **Read Look Ahead (Cache)** – Enabled or disabled as chosen on the Physical Drives Settings tab.
- **Command Queuing** – SATA only. Enabled or disabled.

See “Making Global Physical Drive Settings” on page 150.

Viewing Physical Drive Statistics

To view physical drive statistics:

1. Click the Subsystem icon in Tree View.
2. Click the Enclosures icon.
3. Click the Enclosure icon.
4. Click the Physical Drives icon.
5. Click a Physical Drive icon.
6. From the dropdown menu on the **Information** tab, choose *Statistics*.

Making Physical Drive Settings

The only individual physical drive setting is an alias. An alias is optional. To set an alias for a physical drive:

1. Click the Subsystem icon in Tree View.
2. Click the Enclosures icon.
3. Click the Enclosure icon.
4. Click the Physical Drives icon.
5. Click a Physical Drive icon.
6. Click the **Settings** tab in Management View.
7. Type an alias into the Physical Drive Alias field.

   Maximum of 32 characters. Use letters, numbers, one space between words, and underscore.
8. Click the **Submit** button.

Clearing Stale and PFA Conditions

The Clear tab only appears when one or both conditions are present.

- **Stale** – The physical drive contains obsolete disk array information.
- **PFA** – The physical drive has errors resulting in a prediction of failure.

Be sure you have corrected the condition by a physical drive replacement, rebuild operation, etc., first. Then clear the condition.

To clear a Stale or PFA status from a physical drive:

1. Click the Subsystem icon in Tree View.
2. Click the Enclosures icon.
3. Click the Enclosure icon.
4. Click the Physical Drives icon.
5. Click a Physical Drive icon.
6. in Management View, click the **Clear** tab.
7. Click the **Submit** button.

Note

If a physical drive has both a Stale and a PFA condition, click the **Submit** button once to clear the Stale condition, then click again to clear the PFA condition.

Viewing the SMART Log

To view the SMART Log for a physical drive:

1. Click the Subsystem icon in Tree View.
2. Click the Enclosures icon.
3. Click the Enclosure icon.
4. Click the Physical Drives icon.
5. Click a Physical Drive icon.
6. in Management View, click the **SMART Log** tab.

Basic SMART Log Information for SAS Drives:

- **Physical Drive ID** – Unique ID number of this drive in your VTrak or SuperTrak system.
- **InProgress** – Yes or No. Whether a SMART scan is currently in progress on this drive.
- **SMART Support** – Yes or No. Whether this drive supports SMART.
- **SMART Log Enabled** – Yes or No. Whether SMART Logging is enabled on this drive.
- **SMART Health Status** – OK is normal. N/A means there was no scan.
- **Current Drive Temperature** – The drive's current temperature.
- **Drive Trip Temperature** – Highest recommended operating temperature for this drive.
- **Max Start Stop Count** – Maximum number of times this drive should be powered up and down.
- **Current Start Stop Count** – Actual number of times this drive has been powered up and down.
- **Manufactured Year** – Calendar year the drive was manufactured.
- **Manufactured Week In Year** – Week number out of 52 weeks in the year listed above.

Basic SMART Log Information for SATA Drives:

- **Physical Drive ID** – Unique ID number of this drive in your VTrak or SuperTrak system.
- **InProgress** – Yes or No. Whether a SMART scan is currently in progress on this drive.
- **SMART Support** – Yes or No. Whether this drive supports SMART.
- **SMART Log Enabled** – Yes or No. Whether SMART Logging is enabled on this drive.
- **SMART Health Status** – OK is normal. N/A means there was no scan.

- **SCT Status Version** – SCT status version number for this drive.
- **SCT Version** – SCT version number for this drive.
- **SCT Support Level** – SCT support level for this drive.
- **Device State** – 0 means active.
- **Current Temperature** – The drive's current temperature.
- **Power Cycle Min Temperature** – Lowest temperature the drive reached since the last power up.
- **Power Cycle Max Temperature** – Highest temperature the drive reached since the last power up.
- **Lifetime Min Temperature** – Lowest temperature the drive recorded during its service life.
- **Lifetime Max Temperature** – Highest temperature the drive recorded during its service life.
- **Under Temperature Limit Count** – Number of times SMART found the drive below recommended operating temperature.
- **Over Temperature Limit Count** – Number of times SMART found the drive above recommended operating temperature.

If SMART Logging is disabled, only the first four items in the list are displayed.

SCT stands for SMART Command Transport, a protocol that allows servers using nearline-ready drives to adapt error recovery timing to match the application.

Viewing Advanced SMART Log Information

To view SMART Log information:

1. Click the Subsystem icon in Tree View.
2. Click the Enclosures icon.
3. Click the Enclosure icon.
4. Click the Physical Drives icon.
5. Click a Physical Drive icon.
6. in Management View, click the **SMART Log** tab.
7. Click the **Save Advanced SMART Log** button.
8. Choose the *Open with* option.
9. Choose a text editor from the dropdown menu.
10. Click the **OK** button.

    Advanced SMART Log information displays on your PC in the text editor. This information is different for SAS and SATA drives and varies among different drive models and manufacturers.

Saving Advanced SMART Log Information

To save SMART Log information as a text file:

1. Click the Subsystem icon in Tree View.
2. Click the Enclosures icon.
3. Click the Enclosure icon.
4. Click the Physical Drives icon.
5. Click a Physical Drive icon.
6. in Management View, click the **SMART Log** tab.
7. Click the **Save Advanced SMART Log** button.
8. Choose the *Save File* option.
9. Click the **OK** button.

Advanced SMART Log information is saved as a text file on your PC's desktop.

Making SMART Log Settings

To enable or disable SMART Logging on an individual physical drive:

1. Click the Subsystem icon in Tree View.
2. Click the Enclosures icon.
3. Click the Enclosure icon.
4. Click the Physical Drives icon.
5. Click a Physical Drive icon.
6. From the dropdown menu on the **SMART Log** tab, choose *Settings*.
7. Check the *Enable SMART Log* box to enable SMART Logging.

   Uncheck the box to disable.
8. Click the **Submit** button.

   SMART Logging is enabled or disabled on this drive according to your setting.

Managing Disk Arrays

Disk Array Management includes the following functions:

- Viewing Disk Arrays (page 156)
- Locating a Disk Array (page 156)
- Creating a Disk Array (page 157)
- Deleting a Disk Array (page 163)
- Viewing Disk Array Information (page 163)
- Making Disk Array Settings (page 164)
- Creating a Logical Drive (page 165)
- Deleting a Logical Drive (page 166)
- Migrating a Disk Array (page 167)
- Rebuilding a Disk Array (page 168)
- Running PDM on a Disk Array (page 169)
- Transitioning a Disk Array (page 170)
- Preparing a Disk Array for Transport (page 171)

Viewing Disk Arrays

To view the disk arrays in this enclosure plus any expanded or cascaded enclosures:

1. Click the Subsystem icon in Tree View.
2. Click the Disk Arrays icon.

   A list of disk arrays appears in Management View.

   Click the **DA** link to view a specific disk array. See “Viewing Disk Array Information” on page 163.

Locating a Disk Array

Virtual or Third Party Enclosures

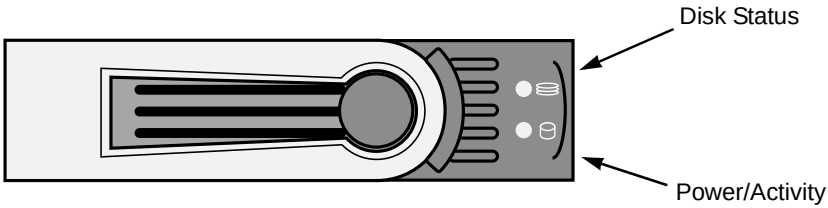
Support for this feature depends on how your system or enclosure was set up. Direct-connect systems with individual LED connections and SGPIO enclosures support individual physical drive LEDs. Other systems or enclosures might or might not support them. See “Appendix D: LED Backplane Connections” on page 295.

To locate a disk array in the enclosure, click the **Locate DAx** button. The LEDs for the carriers holding the physical drives used by the disk array will blink for one minute.

Promise Enclosures

To locate a disk array in a VTrak JBOD enclosure, click the **Locate DAx** button. The disk status LEDs will blink for one minute to identify the carriers holding the physical drives used by the disk array.

Figure 7. VTrak drive carrier LEDs



Creating a Disk Array

WebPAM PRO provides three methods of creating a disk array:

- **Automatic** – Creates a default disk array and logical drive based on unconfigured physical drives in the system. No user choices. If you have multiple enclosures, multiple disk array/logical drive sets are created. See “Creating a Disk Array – Automatic Configuration” on page 158.
- **Express** – You choose the RAID characteristics and type of application. Creates a disk array and logical drive(s) based on your input. See “Creating a Disk Array – Express Configuration” on page 159.
- **Advanced** – You specify all parameters for a new disk array. One logical drive will be made automatically when you create the disk array. If you specify less than the total available capacity, you can use the remaining space to create additional logical drives now or at a later time. See “Creating a Disk Array – Advanced Configuration” on page 161.

Creating a Disk Array – Automatic Configuration

The Disk Array – Automatic Configuration option enables you to create a new disk array following a default set of parameters. One logical drive will be made automatically when you create the disk array.

If you have multiple enclosures, a separate disk array and logical drive set is created for each enclosure.

If you have both Hard Disk Drives (HDD) and Solid State Drives (SSD), two separate disk array and logical drive sets are created. These two drive types cannot be mixed in the same disk array.

To create a Disk Array using the Automatic function:

1. Click the Subsystem icon in Tree View.
2. Click the Disk Arrays icon.
3. From dropdown menu on the **Create** tab, choose *Automatic*.

   The following parameters display:

   - **Disk Arrays** – The number of physical drives in the disk array, their slot numbers, configurable capacity, and the number of logical drives to be created
   - **Logical Drives** – The ID number of the logical drive(s), their RAID level, capacity, and stripe size
   - **Spare Drives** – The physical drive slot number of the dedicated hot spare assigned to this disk array. A hot spare drive is created for all RAID levels except RAID 0, when five or more unconfigured physical drives are available
4. If you accept these parameters, click the **Submit** button.

   The new disk array appears in the Disk Array List the Information tab.

   If you do NOT accept these parameters, use the Advanced option to create your disk array.

Creating a Disk Array – Express Configuration

The Disk Array – Express Configuration option enables you to choose the parameters for a new disk array by specifying the characteristics you want. With this method, you can create multiple logical drives at the same time you create your disk array. However, all of the logical drives will be the same.

If you prefer to specific the parameters directly, use the Advanced option to create your disk array.

If you are uncertain about choosing parameters for your disk array, use the Automatic option.

If you have both Hard Disk Drives (HDD) and Solid State Drives (SSD), two separate disk arrays are created for your HDDs and for your SSDs. Each array will have the number of logical drives that you specified.

To create a new disk array:

1. Click the Subsystem icon in Tree View.
2. Click the Disk Arrays icon.
3. From the dropdown menu on the **Create** tab, choose *Express*.
4. Check the boxes to choose any one or combination of:
   - **Redundancy** – The array will remain available if a physical drive fails
   - **Capacity** – The greatest possible amount of data capacity
   - **Performance** – The highest possible read/write speed
   - **Mixing SATA/SAS Drive** – Check this box if you want to use both SATA and SAS drives in the same disk array.

     If the box is unchecked, and you have both SATA and SAS drives, different arrays will be created for each type of drive.
5. In the Number of Logical Drives field, enter the number of logical drives you want to make from this disk array.
6. From the Application Type menu, choose an application that best describes your intended use for this disk array:
   - File Server
   - Video Stream
   - Transaction Data
   - Transaction Log
   - Other
7. Click the **Update** button.

Or check the *Automatic Update* box and updates will occur automatically.

The following parameters display:

- **Disk Arrays** – The number of physical drives in the disk array, their slot numbers, configurable capacity, and the number of logical drives to be created
- **Logical Drives** – The slot number of the logical drive(s), their RAID level, capacity, and stripe size
- **Spare Drives** – The physical drive slot number of the dedicated hot spare assigned to this disk array (all RAID levels except RAID 0), when five or more unconfigured physical drives are available

If you accept these parameters, proceed to the next step.

If you do NOT accept these parameters, review and modify your choices in the previous steps.

8. When you are done, click the **Submit** button.

The new disk array appears in the Disk Array List the Information tab.

Creating a Disk Array – Advanced Configuration

The Disk Array – Advanced Configuration option enables you to directly specify all parameters for a new disk array. One logical drive will be made automatically when you create the disk array. If you specify less than the total available capacity, you can use the remaining space to create additional logical drives now or at a later time.

If you are uncertain about choosing parameters for your disk array, use the Express or Automatic option to create your disk array.

To create a new disk array:

1. Click the Subsystem icon in Tree View.
2. Click the Disk Arrays icon.
3. From the dropdown menu on the **Create** tab, choose *Advanced*.

Step 1 – Disk Array Creation

1. Enter a name for the disk array in the field provided.
2. Check the *Enable Media Patrol* box if you want to enable Media Patrol.

   For more information, see “Media Patrol” on page 255.
3. Check the *Enable PDM* box if you want to enable PDM.

   For more information, see “Predictive Data Migration (PDM)” on page 255.
4. Choose a type of physical drive from the Media Type dropdown menu.

   HDD is a hard disk drive. SSD is a solid state drive. You cannot mix HDDs and SSDs in the same disk array.
5. Highlight physical drives you want in the disk array from the Available list and press the **>>** button to move them to the Selected list.

   You can also double-click them to move them.
6. When you are done, click the **Next** button.

Step 2 – Logical Drive Creation

Logical Drive Creation enables you to specify logical drives under the new disk array. Enter the information for a logical drive, then click the **Update** button. If there is free capacity remaining, you can specify another logical drive now or wait until later. You can create up to 32 logical drives per array.

1. Optional. Type an alias into the field provided.
2. Choose a RAID level for the logical drive from the dropdown menu.

   The choice of RAID levels depends the number of physical drives you selected.
3. RAID 50 and 60 only. Specify the number of axles for your array.

   See “RAID 50 Axles” on page 235 or “RAID 60 Axles” on page 238.

4. Specify a Capacity and the unit of measure (MB, GB, TB).

   This value will be the data capacity of the first logical drive in your new disk array. If you specify less than disk array's maximum capacity, the remainder will be available for additional logical drives which you can create later.

5. Specify a Stripe size from the dropdown menu.

   64 KB, 128 KB, 256 KB, and 1 MB are available. 64 KB is the default.

6. Specify a Sector size from the dropdown menu.

   512 B, 1 KB, 2 KB, and 4 KB are available. 512 B is the default.

7. Specify a Read (cache) Policy from the dropdown menu.

   Read Cache, Read Ahead Cache, and No Cache are available. Read Ahead is the default.

8. Specify a Write (cache) Policy from the dropdown menu.

   Write Back and Write Through are available. Write Back is the default.

9. From the Initialization dropdown menu, choose an Initialization policy.

   None, *Quick*, and *Full* are available. None is the default but is not recommended. See “Initialization” on page 247.

10. Click the **Update** button.

    A new logical drive is displayed under New Logical Drives.

    Repeat the above steps to specify additional logical drives as desired.

11. When you are done specifying logical drives, click the **Next** button.

Step 3 – Summary

The Summary lists the disk array and logical drive information you specified.

To proceed with disk array and logical drive creation, click the **Submit** button.

The new disk array appears in the Disk Array List the Information tab.

Note

This function does not automatically create a hot spare drive. After the disk array is created, you can create a hot spare drive for it. For more information, see “Creating a Spare Drive” on page 179.

Deleting a Disk Array

Warning

When you delete a disk array, you also delete any logical drives that belong to it, along with the data in those logical drives. Back up any important data before deleting a disk array.

To delete a disk array:

1. Click the Subsystem icon in Tree View.
2. Click the Disk Arrays icon.
3. Click the **Delete** tab in Management View.
4. Check the box to the left of the disk array you want to delete.
5. Click the **Submit** button.
6. In the confirmation box, type the word **confirm** in the field provided.
7. Click the **OK** button.

   The chosen disk array disappears from the Disk Array List the Information tab.

Viewing Disk Array Information

To view Disk Array information:

1. Click the Subsystem icon in Tree View.
2. Click the Disk Arrays icon.
3. Click the Disk Array icon.

   The disk array information is shown in Management View.

Disk Array Operational Status

- **OK** – This is the normal state of a logical drive. When a logical drive is Functional, it is ready for immediate use. For RAID Levels other than RAID 0, the logical drive has full redundancy.
- **Synchronizing** – This condition is temporary. Synchronizing is a maintenance function that verifies the integrity of data and redundancy in the logical drive. When a logical drive is Synchronizing, it will function and your data is available. However, access will be slower due to the synchronizing operation.
- **Critical / Degraded** – This condition arises as the result of a physical drive failure. A degraded logical drive will still function and your data is still

available. However, the logical drive has lost redundancy (fault tolerance). You must determine the cause of the problem and correct it.

- **Rebuilding** – This condition is temporary. When a physical drive has been replaced, the logical drive automatically begins rebuilding in order to restore redundancy (fault tolerance). When a logical drive is rebuilding, it will function and your data is available. However, access will be slower due to the rebuilding operation.
- **Transport Ready** – After you perform a successful Prepare for Transport operation, this condition means you can remove the physical drives of this disk array and move them to another enclosure or different drive slots. After you relocate the physical drives, the disk array status will show OK.

Physical Drive Status

- **OK** – This is the normal state of a physical drive.
- **Forced Offline** – This drive was forced offline by the user.
- **Forced Online** – This drive was forced online by the user.
- **Transition Running** – A Transition is running that involves this physical drive.
- **PDM Running** – PDM is running on this physical drive.
- **Media Patrol Running** – Media Patrol is running on this physical drive.
- **Stale** – The physical drive contains obsolete disk array information. Click the **Clear** tab.
- **PFA** – The physical drive has errors resulting in a prediction of failure. Click the **Clear** tab.
- **Offline** – This condition arises as the result of a second physical drive failure. An Offline logical drive is not accessible but some or all of your data may remain intact. You must determine the cause of the problem and correct it.
- **Dead** – The physical drive has failed.

Making Disk Array Settings

To make Disk Array settings:

1. Click the Subsystem icon in Tree View.
2. Click the Disk Arrays icon.
3. Click the Disk Array icon.
4. Click the **Settings** tab in Management View.

5. Optional. Enter an alias in the Disk Array Alias field.

   Maximum of 32 characters. Use letters, numbers, one space between words, and underscore. An alias is optional.
6. To enable Media Patrol support, check the Media Patrol box.
7. To enable PDM support, check the PDM box.
8. Click the **Submit** button.

Creating a Logical Drive

When you create a disk array, you automatically create one logical drive also. If the initial logical drive used less than the full capacity of the disk array, you can create additional logical drives from the same disk array. You can create up to 32 logical drives per array.

To create a logical drive:

1. Click the Subsystem icon in Tree View.
2. Click the Disk Arrays icon.
3. Click the Disk Array icon.
4. Click the **Create LD** tab in Management View.
5. Optional. Enter an alias (name) in the Alias field.

   Maximum of 32 characters. Use letters, numbers, one space between words, and underscore. An alias is optional.
6. From the RAID Level dropdown list, choose a RAID level for this logical drive.

   All RAID levels supported by the disk array appear in the list. See “Choosing a RAID Level” on page 240.
7. Enter a capacity and choose unit of measure (MB, GB, TB).

   The default value is the available capacity of the disk array. You can use this value or any lesser amount.
8. From the Stripe dropdown menu, choose a Stripe size for this logical drive.

   The choices are *64 KB*, *128 KB*, *256 KB*, *512 KB*, and *1 MB*. 64 KB is the default. See “Choosing Stripe Block Size” on page 244.
9. From the Sector dropdown menu, choose a Sector size for this logical drive.

   The choices are *512 B*, *1 KB*, *2 KB*, and *4 KB*. 512 B is the default. See “Choosing Sector Size” on page 244.
10. From the Read Policy dropdown menu, choose a Read Cache policy for this logical drive.

    The choices are *Read Cache*, *Read Ahead*, and *No Cache*. Read Ahead is the default. See “Choosing Cache Policy” on page 245.

11. From the Write Policy dropdown menu, choose a Write Cache policy for this logical drive.

    The choices are *Write Through* and *Write Back*. Write Back is the default. If you chose No Cache under Read Cache, this setting will be Write Through. See “Choosing Cache Policy” on page 245.

12. From the Initialization dropdown menu, choose an Initialization policy.

    The choices are *None*, *Quick* and *Full.* See “Initialization” on page 247.

13. Click the **Update** button to enter the logical drive parameters.
14. Review the results. If there is remaining space the disk array, you can create another logical drive, following the steps above. Each logical drive can have a different set of parameters.
15. Click the **Next** button when you are done.

    A new window displays with the disk array information and the proposed logical drives with their parameters.

16. Click the **Submit** button create the logical drives.

    The new logical drive appears in the Logical Drive List the Information tab.

If you created a fault-tolerant logical drive (any RAID level except RAID 0), the Operational Status of new logical drive will display *Synchronizing* for several minutes after creation. You can use the logical drive during this period but read/write performance could be slower than normal.

Deleting a Logical Drive

Warning

All data the logical drive will be lost. Back up any valuable data before deleting the logical drive.

To delete a logical drive:

1. Click the Subsystem icon in Tree View.
2. Click the Disk Arrays icon.
3. Click the Disk Array icon.
4. Click the **Delete LD** tab in Management View.
5. Check the box to the left of the logical drive you want to delete.
6. Click the **Submit** button.

   In the confirmation box, type the word **confirm** in the field provided.

7. Click the **OK** button.

   The chosen logical disappears from the Logical Drive List the Information tab.

Migrating a Disk Array

On SuperTrak, RAID level migration is performed on the disk array but it applies to the logical drives. The action of migrating a disk array means either or both:

- Change its RAID Level
- Increase the number of disk drives (sometimes called *expansion*)

For a list of Migration options and other important information, see “RAID Level Migration” on page 248.

To Migrate an existing disk array:

1. Click the Subsystem icon in Tree View.
2. Click the Disk Arrays icon.
3. Click the Disk Array icon.
4. From the dropdown menu on the **Background Activities** tab, choose *Start Migration*.
5. Highlight physical drives you want in the disk array from the Available list and press the >> button to move them to the Selected list. You can also double-click them to move them.

   The added drives must be the same media type, HDD or SDD, as the other physical drives in the disk array.
6. When you are done, click the **Next** button.
7. Choose a new RAID Level, if desired.

   Note: If the source array is RAID 10 and you want the target array to be RAID 10, you must specify RAID 10 under RAID level.
8. To expand the capacity of one or more logical drives, check the Expand Capacity box.
9. If you checked the Expand Capacity box, enter a number into the Capacity field and choose the appropriate unit of measure (MB, GB, TB).
10. Under Capacity Usage, highlight the logical drive whose RAID level you want to change or whose capacity you want to expand.
11. Click the **Update** button.

    The logical drive changes to reflect your choices.
12. Update other logical drives using the same method.
13. When you are done making changes, click the **Next** button.

14. Click the **Submit** button to begin Migration.

    In the confirmation box, type the word **confirm** in the field provided.

15. Click the **OK** button.

To set Migration priority, see “Making Background Activity Settings” on page 137.

Rebuilding a Disk Array

When you rebuild a disk array, you are actually rebuilding the data onto a replacement physical drive.

Rebuilding Automatically

Normally, a Critical disk array automatically rebuilds itself using a designated spare drive. See “Creating a Spare Drive” on page 99 or page 179.

If you do not have a spare drive, the Critical disk array automatically rebuilds itself as soon as you remove the failed drive and insert a replacement drive. Note the replacement drive requirements, below.

Rebuilding Manually

Important

The replacement physical drive must be:

- The same media type, HDD or SDD, as the other drives in the array.
- Equal or larger capacity than the failed drive it replaces.
- Free of any previous configuration data. See “Clearing Stale and PFA Conditions” on page 152 or page 269.

If the Auto Rebuild function is disabled and no spare drives are available, you must initiate the procedure.

First, identify and replace the failed physical drive. Then rebuild the disk array as described below:

1. Click the Subsystem icon in Tree View.
2. Click the Disk Arrays icon.
3. Click the Disk Array icon.

   If there are multiple disk arrays, choose the icon with the yellow !.
4. From the dropdown menu on the **Background Activities** tab, choose *Start Rebuild*.
5. Choose Source physical drive.

The Source is a remaining functional physical drive in the disk array.

6. Choose the Target physical drive.

   The Target is the replacement physical drive.

7. Click the **Submit** button.

The Disk Array Background Activity tab shows rebuild progress on the replacement (target) physical drive. Depending the size of the physical disk involved, this process will take some time.

To view more information, click the **Rebuild on PDx** link.

To set Rebuild priority or enable Auto Rebuild, see “Making Background Activity Settings” on page 137.

Running Media Patrol on a Disk Array

Media Patrol checks the magnetic media on physical drives. When it finds the specified number of bad blocks, it will trigger PDM. See “Making Background Activity Settings” on page 137 and “Running PDM” on page 138.

You can schedule Media Patrol to run automatically, see “Scheduling an Activity” on page 139.

To start Media Patrol:

1. Click the Subsystem icon in Tree View.
2. Click the Disk Arrays icon.
3. Click the Disk Array icon.
4. From the dropdown menu on the **Background Activities** tab, choose *Start Media Patrol*.
5. Click the **Start** button.

Running PDM on a Disk Array

Predictive Data Migration (PDM) migrates data from the suspect physical drive to a spare physical drive, similar to Rebuilding. But unlike Rebuilding, PDM acts *before* the disk drive fails and your Logical Drive goes Critical.

The target physical drive must be the same media type, HDD or SDD, as the other physical drives in the disk array.

See “Predictive Data Migration (PDM)” on page 255.

To start PDM:

1. Click the Subsystem icon in Tree View.
2. Click the Disk Arrays icon.

3. Click the Disk Array icon.
4. From the dropdown menu on the **Background Activities** tab, choose *Start PDM*.
5. In the next screen, choose the *Source* and *Target* physical drives.

   The suspect physical drive is the Source.

   The replacement physical drive is the Target.
6. Click the **Start** button.

Transitioning a Disk Array

Transition is the process of replacing a revertible spare drive that is currently part of a disk array with an unconfigured physical drive or a non-revertible spare. The revertible spare drive returns to its original status. For more information, see “Transition” on page 256.

In order to run the Transition function:

- The spare drive must be Revertible.
- You must specify an unconfigured physical drive of the same or larger capacity to replace the revertible spare drive.
- The unconfigured physical drive must be the same media type, HDD or SDD, as the other physical drives in the disk array.

To run a Transition:

1. Click the Subsystem icon in Tree View.
2. From the dropdown menu on the **Background Activities** tab, choose *Start Transition*.
3. Choose an unconfigured physical drive from the list of available drives.

After Transition is completed, refresh the screen. The revertible spare drive will be listed under the Spare Drives icon and the disk array’s operational status will show OK.

To set Transition priority, see “Making Background Activity Settings” on page 137.

Preparing a Disk Array for Transport

Important

Before you can use this feature:

- There must be a dedicated spare disk drive assigned to this disk array.
- The disk array's Operational Status must be OK.

To prepare a disk array for transport:

1. Click the Subsystem icon in Tree View.
2. Click the Disk Arrays icon.
3. Click the Disk Array icon.
4. Click the **Transport** tab in Management View.
5. Click the **Submit** button.
6. In the confirmation box, type the word **confirm** in the field provided.
7. Click the **OK** button.
8. After the Transition is complete, move the physical drives comprising the disk array to their new locations.
9. Click the **Refresh** button in your Browser.

   The drives appear in their new locations and disk array status displays OK.

Managing Logical Drives

Logical drives are made from disk arrays. In the Tree, you can see a graphic representation of the logical drives that belong to each array.

You can also see all logical drives in the subsystem under Logical Drive Summary. See page 182.

Logical drive management includes the following functions:

- Viewing Information for All Logical Drives (page 172)
- Locating a Logical Drive (page 173)
- Viewing Logical Drive Information (page 173)
- Viewing Logical Drive Statistics (page 174)
- Changing Logical Drive Settings (page 174)
- Initializing a Logical Drive (page 175)
- Running Redundancy Check (page 176)
- Viewing the Logical Drive Check Table (page 176)

Viewing Information for All Logical Drives

To view information about all logical drives in a disk array:

1. Click the Subsystem icon in Tree View.
2. Click the Disk Arrays icon.
3. Click the Disk Array icon.
4. Click the Logical Drives icon

Logical Drive Status

- **OK** – This is the normal state of a logical drive. When a logical drive is OK, it is ready for immediate use. For RAID Levels other than RAID 0 (Striping), the logical drive has fault tolerance.
- **Synchronizing** – This condition is temporary. Synchronizing is a maintenance function that verifies the integrity of data and redundancy in the logical drive. When a logical drive is Synchronizing, it will function and your data is available. However, access will be slower due to the synchronizing operation.
- **Critical/Degraded** – This condition arises as the result of a physical drive failure. Or, one of the physical drives was accidently or intentionally disconnected or pulled from its enclosure. A critical or degraded logical drive will still function and your data is still available. However, the logical drive has lost its fault tolerance.

- **Rebuilding** – This condition is temporary. When a physical drive has been replaced, the logical drive automatically begins rebuilding in order to restore fault tolerance. When a logical drive is rebuilding, it will function and your data is available. However, access will be slower due to the rebuilding operation.

For a Degraded or Offline logical drive, see “Critical & Offline Logical Drives” on page 267.

Locating a Logical Drive

Virtual or Third Party Enclosures

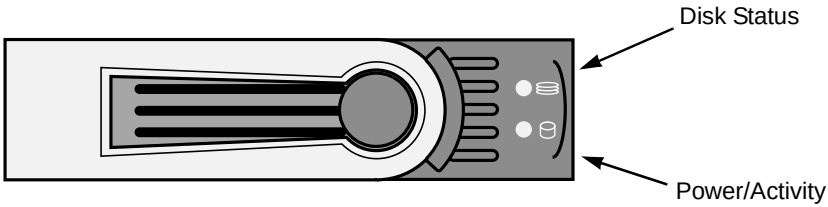
Support for this feature depends on how your system or enclosure was set up. Direct-connect systems with individual LED connections and SGPIO enclosures support individual physical drive LEDs. Other systems or enclosures might or might not support them. See “Appendix D: LED Backplane Connections” on page 295.

To locate a logical drive in the enclosure, click the **Locate LDx** button. The LEDs for the carriers holding the physical drives used by the logical drive will blink for one minute.

Promise Enclosures

To locate a logical drive in the VTrak JBOD enclosure, click the **Locate LDx** button. The disk status LEDs will blink for one minute to identify the carriers holding the physical drives used by the logical drive.

Figure 8. VTrak drive carrier LEDs



Viewing Logical Drive Information

To view information for a single logical drive:

1. Click the Subsystem icon in Tree View.
2. Click the Disk Arrays icon.
3. Click the Disk Array icon.
4. Click the Logical Drives icon

5. Click the Logical Drive icon.

To specify an Alias or set the Read and Write Policies, click the **Settings** tab.

Logical Drive Status

See “Logical Drive Status” on page 172.

Logical Drive Synchronization

Synchronization is an automatic procedure applied to logical drives when they are created. “Yes” means the logical drive was synchronized.

Adjustable Items

- Alias – Optional
- Read Policy
- Write Policy

See “Changing Logical Drive Settings” on page 174.

Viewing Logical Drive Statistics

To view information for a single logical drive:

1. Click the Subsystem icon in Tree View.
2. Click the Disk Arrays icon.
3. Click the Disk Array icon.
4. Click the Logical Drives icon
5. Click the Logical Drive icon.
6. From the dropdown menu on the **Information** tab, choose *Statistics*.

Changing Logical Drive Settings

To make logical drive settings:

1. Click the Subsystem icon in Tree View.
2. Click the Disk Arrays icon.
3. Click the Disk Array icon.
4. Click the Logical Drives icon
5. Click the Logical Drive icon.
6. Click the **Settings** tab in Management View.
7. Optional. Enter an alias in the Logical Drive Alias field.

Maximum of 32 characters. Use letters, numbers, one space between words, and underscore. An alias is optional.

8. From the Read Policy dropdown menu, choose a Read Cache policy.

   The choices are *Read Cache*, *Read Ahead*, and *No Cache*. See “Choosing Cache Policy” on page 245.

9. From the Write Policy dropdown menu, choose a Write Cache policy.

   The choices are *Write Back* and *Write Through*. If you chose No Read Cache, Write policy is automatically Write Through. See “Choosing Cache Policy” on page 245.

10. Click the **Submit** button.

Initializing a Logical Drive

Initialization sets the data bits in the logical drive to zero. The action removes any residual data left behind from earlier configurations. Initialization is recommended for new logical drives. You can also initialize an existing logical drive. See “Initialization” on page 247 for more information.

Warning

When you initialize a logical drive, all the data the logical drive will be lost. Backup any important data before you initialize a logical drive.

To initialize a logical drive:

1. Click the Subsystem icon in Tree View.
2. Click the Logical Drive Summary icon.
3. Click the icon of the logical drive you want to Initialize.
4. From the dropdown menu on the **Background Activities** tab, choose *Initialization*.
   - To choose Quick Initialization, check the box.
   - If you checked the Quick Initialization box, enter a value in the Quick Initialization Size field. This value is the size of the initialization blocks in MB.
   - If you did not choose Quick Initialization, enter a hexidecimal value in the Initialization Pattern in Hex field or use the default 00000000 value.
5. Click the **Submit** button.
6. In the confirmation box, type the word **confirm** in the field provided.
7. Click the **OK** button.

To view the progress of the Initialization, click the **Background Activities** tab.

To set Initialization priority, see “Making Background Activity Settings” on page 137.

You can also start Initialization from the Subsystem icon, Background Activities tab.

Running Redundancy Check

Redundancy Check is a routine maintenance procedure for fault-tolerant disk arrays (those with redundancy) that ensures all the data matches exactly. Redundancy Check can also correct inconsistencies. You can also schedule a Redundancy Check. See “Scheduling an Activity” on page 139.

Redundancy Check a Logical Drive:

1. Click the Subsystem icon in Tree View.
2. Click the Logical Drive Summary icon.
3. Click the icon of the logical drive you want to Redundancy Check.
4. From dropdown menu on the **Background Activities** tab, choose *Redundancy Check*.
   - To choose *Auto Fix*, check the box.

     This feature attempts to repair the problem when it finds an error.
   - To choose *Pause On Error*, check the box.

     This feature stops the process when it finds an error.

     If Auto Fix is also checked, the process stops only when it finds a non-repairable error.
5. Click the **Submit** button.

To view the progress of the Redundancy Check, click the **Background Activities** tab.

To set Redundancy Check priority, see “Making Background Activity Settings” on page 137.

You can also start Redundancy check from the Subsystem icon Background Activities tab

Viewing the Logical Drive Check Table

The Logical Drive Check Table displays errors related to a logical drive. Use this information to evaluate the integrity of the logical drive and to determine whether corrective action is needed. To View the tables:

1. Click the Subsystem icon in Tree View.
2. Click the Disk Arrays icon.

3. Click the Disk Array icon.
4. Click the Logical Drives icon
5. Click the Logical Drive icon.
6. Click the **Check Table** tab in Management View.
7. Click the option for the table you want to see.

   The default is All tables.

   If there are entries, they are listed as follows:

   - **Entry Number** – A number assigned to each block of entry.
   - **Table Type** – Read Check, Write Check or Inconsistent Block (see below).
   - **Start Logical Block Address** – LBA of the first block for this entry.
   - **Count** – Number of continuous blocks starting from this LBA.
   - **Read Check Table** – Contains a list of read errors for this logical drive.
   - **Write Check Table** – Contains a list of write errors for this logical drive.
   - **Inconsistent Block Table** – Contains a list of inconsistent blocks for this logical drive.
     - Mirror data for RAID Levels 1, 1E, and 10.
     - Parity data for RAID Levels 5, 6, 50, and 60.
     - Inconsistent blocks are identified by the Redundancy Check.

Managing Spare Drives

When a physical drive in a disk array fails and a spare drive of the same type and adequate capacity is available, the disk array will begin to rebuild automatically using the spare drive.

See “Hot Spare Drive” on page 248 and “Rebuilding a Disk Array Automatically” on page 270.

Spare drive management includes the following functions:

- Viewing a List of Spare Drives (page 178)
- Creating a Spare Drive (page 179)
- Deleting Spare Drive (page 180)
- Making Spare Drive Settings (page 180)
- Running Spare Check (page 181)

Viewing a List of Spare Drives

To view a list of spare drives:

1. Click the Subsystem icon in Tree View.
2. Click the Spare Drives icon.

The information includes:

- **ID** – The unique ID number assigned to the spare drive.
- **Operational Status** – OK is normal. Can also show Rebuilding, Transition Running, PDM Running, or Offline.
- **Physical Drive ID** – The ID number of the physical drive assigned as a spare
- **Capacity** – The data storage capacity of this spare drive.
- **Revertible** – Yes or No. A revertible spare drive automatically returns to its spare drive assignment after the failed physical drive in the disk array is replaced. See “Transition” on page 256 for more information.
- **Type** – Global, can be used by any disk array. Dedicated, can only be used by the assigned disk arrays.
- **Dedicated to Disk Arrays** – For dedicated spares, the disk arrays to which they are assigned. Global spares show N/A.

Creating a Spare Drive

Important

- There must be an unconfigured physical drive available to assign as a spare drive. See “Viewing a List of Physical Drives” on page 149.
- Be sure the spare drive you choose has capacity equal to or greater than the smallest physical drive assigned to the disk array.
- A dedicated spare drive must be the same media type, HDD or SDD, as the other physical drives in the disk array.
- Free of any previous configuration data. See “Clearing Stale and PFA Conditions” on page 152 or page 269.

To create a spare drive:

1. Click the Subsystem icon in Tree View.
2. Click the Spare Drives icon.
3. Click the **Create** tab in Management View.
4. Choose a spare type, *Global* or *Dedicated* and click the **Next** button.
5. To make a revertible spare drive, check the Revertible box.
6. To enable Media Patrol on this spare drive, check the Enable Media Patrol box.
7. Dedicated spare drives only. Choose a type of physical drive from the Media Type dropdown menu.

   HDD is a hard disk drive. SSD is a solid state drive. Physical drive type of the spare must match the disk array.
8. In the Physical drives field, highlight the physical drive you want to assign as a spare drive in the Available list and press the **>>** button to move the drive to the Selected list.

   You can also double-click drives to move them.
9. Dedicated spare drives only. In the Dedicated to Disk Arrays field, highlight disk array to which you want assign the spare drive from the Available list and press the **>>** button to move the array to the Selected list.

   You can also double-click arrays to move them.
10. Click the **Update** button.

    Your choices are displayed under New Hot Spare Drives.
11. If you agree with the proposed choices, click the **Submit** button.

Deleting Spare Drive

Note

If an existing spare drive has the wrong parameters for your needs, click the **Settings** tab to change the parameters rather than delete the spare drive and create a new one.

To delete a spare drive:

1. Click the Subsystem icon in Tree View.
2. Click the Spare Drives icon.
3. Click the **Delete** tab in Management View.
4. Check the box to the left of the spare drive you want to delete.
5. Click the **Submit** button.

   In the confirmation box, type the word **confirm** in the field provided.
6. Click the **OK** button.

Making Spare Drive Settings

To change spare drive settings:

1. Click the Subsystem icon in Tree View.
2. Click the Spare Drives icon.
3. Click the Spare Drive icon.
4. Click the **Settings** tab in Management View.
5. Choose a spare type, *Global* or *Dedicated*.
6. To make a revertible spare drive, check the Revertible box.
7. To enable Media Patrol on this spare drive, check the Enable Media Patrol box.
8. If you chose a *Dedicated* spare drive, in the Dedicated to Disk Arrays field, highlight the disk array to which you want assign the spare drive from the Available list and press the **>>** button to move them to the Selected list.

   You can also double-click array to move it.
9. Click the **Submit** button.

Running Spare Check

Spare Check verifies the operational status of your spare drives. You can also schedule a Spare Check. See “Scheduling an Activity” on page 139.

To check a spare drive:

1. Click the Subsystem icon in Tree View.
2. Click the Spare Drives icon.
3. Click the **Spare Check** tab in Management View.
4. From the Physical Drive dropdown menu, choose the spare drive you want to check.

   Or choose *All* to check all the spare drives at the same time.
5. Click the **Submit** button.

   The results of the Spare Check appear under Spare Check Status in the Information tab. “Healthy” means normal condition.

Working with the Logical Drive Summary

The Logical Drive Summary displays a list of all logical drives under the SuperTrak controller including logical drives in expanded or cascaded enclosures. This list does not arrange the logical drives under the disk array to which they belong nor under the enclosure in which they are located.

Logical Drive Summary includes the following functions:

- Viewing a List of All Logical Drives (page 182)
- Locating a Logical Drive (page 182)
- Viewing Individual Logical Drive Information (page 183)

Viewing a List of All Logical Drives

To view a list of all logical drives in all enclosures:

1. Click the Subsystem icon in Tree View.
2. Click the Logical Drive Summary icon.

Locating a Logical Drive

Virtual or Third Party Enclosures

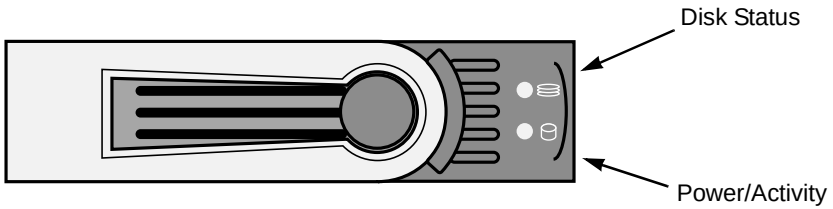
Support for this feature depends on how your system or enclosure was set up. Direct-connect systems with individual LED connections and SGPIO enclosures support individual physical drive LEDs. Other systems or enclosures might or might not support them. See “Appendix D: LED Backplane Connections” on page 295.

To locate a logical drive in the enclosure, click the **Locate LDx** button. The LEDs for the carriers holding the physical drives used by the logical drive will blink for one minute.

Promise Enclosures

To locate a logical drive in the VTrak JBOD enclosure, click the **Locate LDx** button. The disk status LEDs will blink for one minute to identify the carriers holding the physical drives used by the logical drive.

Figure 9. VTrak drive carrier LEDs



Viewing Individual Logical Drive Information

1. Click the Subsystem icon in Tree View.
2. Click the Logical Drive Summary icon.
3. Click the Logical Drive icon.

   The information and location for the logical drive appear in Management View. See Viewing Logical Drive Information (page 173).

Chapter 6: Management with the CLI

- Opening the CLI on Windows (below)
- Opening the CLI on Linux, FreeBSD, and VMware (page 186)
- Table of Supported Commands (page 187)
- Notes and Conventions (page 189)
- List of Supported Commands (page 190)

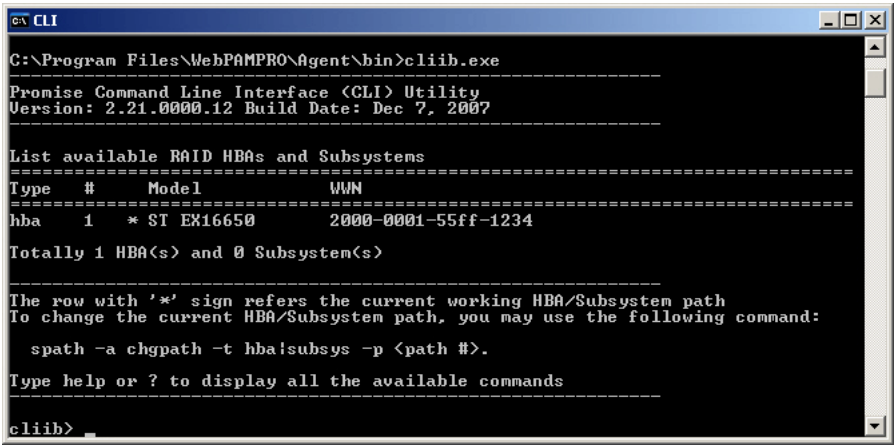
SuperTrak EX Controller's Command Line Interface (CLI) provides rapid setup of disk arrays and logical drives. You can also manage your SuperTrak system using the CLI. However, ongoing management is much easier with the SuperBuild utility or WebPAM PRO.

Opening the CLI on Windows

To open the CLI, click the **CLI icon** on the desktop (right), or:

1. Go to **Start > Run** and click the **Browse** button.
2. Navigate to the **C:\Program Files\WebPAMPRO\Agent\bin** folder.
3. Click **cliib.exe** file then click the **Open** button.
4. Click the **OK** button in the Run dialog box.

   The CLI window opens.


CLI
C:\Program Files\WebPAMPRO\Agent\bin>cliib.exe
Promise Command Line Interface (CLI) Utility
Version: 2.21.0000.12 Build Date: Dec 7, 2007
List available RAID HBAs and Subsystems
Type # Model WWN
hba 1 * ST EX16650 2000-0001-55ff-1234
Totally 1 HBA(s) and 0 Subsystem(s)
The row with '*' sign refers the current working HBA/Subsystem path
To change the current HBA/Subsystem path, you may use the following command:
spath -a chgpath -t hba|subsys -p <path #>.
Type help or ? to display all the available commands
cliib>

Opening the CLI on Linux, FreeBSD, and VMware

To open the CLI:

1. Open a terminal window.
2. Go to the **/opt/Promise/WebPAMPRO/Agent** directory.
3. Type **./startCLI.sh** and press Enter.
   The CLI runs in the terminal window.

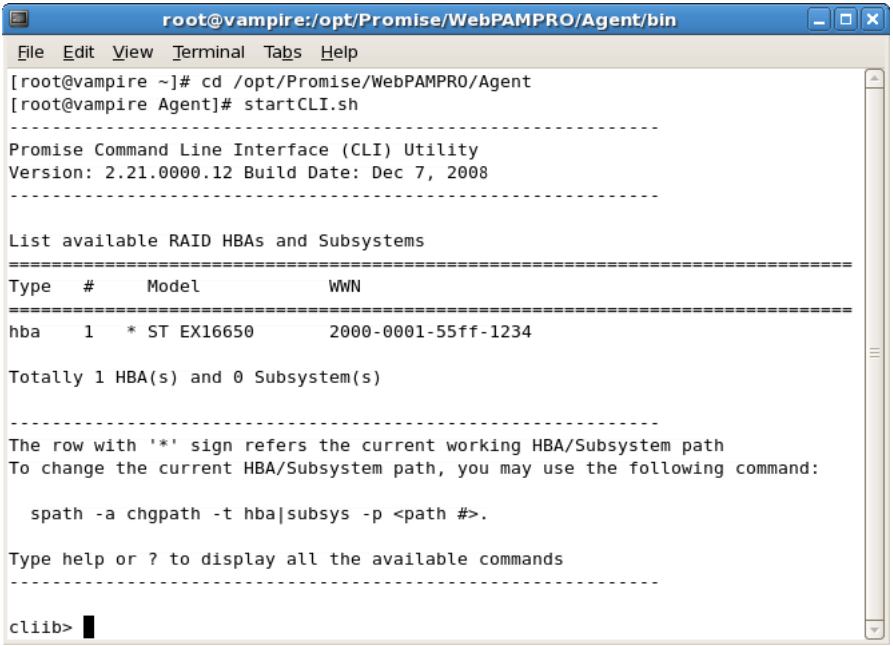

root@vampire:/opt/Promise/WebPAMPRO/Agent/bin
File Edit View Terminal Tabs Help
[root@vampire ~]# cd /opt/Promise/WebPAMPRO/Agent
[root@vampire Agent]# startCLI.sh
Promise Command Line Interface (CLI) Utility
Version: 2.21.0000.12 Build Date: Dec 7, 2008
List available RAID HBAs and Subsystems
Type # Model WWN
hba 1 * ST EX16650 2000-0001-55ff-1234
Totally 1 HBA(s) and 0 Subsystem(s)
The row with '*' sign refers the current working HBA/Subsystem path
To change the current HBA/Subsystem path, you may use the following command:
spath -a chgpath -t hba|subsys -p <path #>.
Type help or ? to display all the available commands
cliib>

Table of Supported Commands

Command	Action
about	View utility information.
array	View or edit array information. Create, edit, or delete a new or existing array. Create, edit, or delete logical drives in an existing array. To physically locate an array in an enclosure. Accept an incomplete array condition.
battery	Subsystems only. View battery information or to recondition a battery.
bbm	View or clear the BBM defect list of the specified configured physical drive.
bga	View status of all current background activities. Enable or disable relevant background activities. Modify the background task rate for each of the background tasks.
buzz	View buzzer status, enable/disable and turn on/off buzzer.
checktable	View logical drive error tables.
config	For express or automatic configuration. For advanced configuration please see the 'array' command.
ctrl	View or edit controller information and settings.
date	View or edit system time.
enclosure	View or edit enclosure and SEP information and settings. Locate an enclosure via LEDs.
event	View or clear events logs.
export	Subsystems only. Export files to remote tftp host.
factorydefaults	Restore settings to factory defaults.
init	View logical drive initialization status and progress. Start, stop, pause, or resume an initialization or a quick initialization.

Command	Action
logdrv	View or edit logical drive information and settings. Locate a logical drive via LEDs.
migrate	Start and monitor disk array migration process.
mp	View media patrol status and progress. Start, stop, pause, or resume media patrol.
pdm	View PDM status and progress. Start, stop, pause, or resume PDM process.
phydrv	View or edit physical drive information and settings. Locate a physical drive via LEDs.
ptiflash	Update system software and firmware through local host.
rc	View redundancy check status and progress. Start, stop, pause or resume redundancy check.
rb	View rebuild status and progress. Start, stop, pause, or resume a rebuild process.
sc	View spare check status. Start spare check.
smart	View SMART logs and enable SMART on physical drives.
spare	Create or modify hot spare drives.
spath	Discover and change subsystem path.
stats	View or reset statistics.
subsys	View or edit subsystem information and settings.
sync	View logical drive synchronization status and progress.
topology	View SAS topology, the physical connections and device information. For products that support multiple enclosures only.
transit	View transition status and progress. Start, stop, pause, or resume a transition process.
help	When used alone will display this menu. When used in conjunction with a command (example: help array) it will display help information for that particular command.

Command	Action
?	This can be used in place of the help command or optionally can be used as a switch for a command (example: array -?) to provide command usage.
Note: Commands are NOT case sensitive.	

Notes and Conventions

Commands and options are NOT case sensitive.

Not all extended keys are supported. However, you can use the backspace and the left and right arrow keys for command line editing. In addition, the up and down arrow keys allow scrolling through the command history buffer.

If you need context-sensitive help, type one of the following commands:

- <command> -h
- <command> -?
- help <command>

That action will display full context-sensitive help for the specific command.

Each command when used alone, such as “array” will display a summary of relevant information. If more information is desired, the -v verbose mode can be used. This will provide information for all relevant aspects of that command.

Usage terminology is as follows:

- [square braces] depict an optional switch
- <arrow braces> depict user input
- Type " | more" at the end of each command, to display info page by page

List of Supported Commands

- about (page 190)
- array (page 190)
- battery (page 194)
- bbm (page 195)
- bga (page 195)
- buzz (page 198)
- checktable (page 198)
- config (page 199)
- ctrl (page 200)
- date (page 203)
- enclosure (page 203)
- event (page 205)
- export (page 206)
- factorydefaults (page 206)
- init (page 207)
- logdrv (page 209)
- migrate (page 210)
- mp (page 211)
- pdm (page 211)
- phydrv (page 212)
- ptiflash (page 215)
- rc (page 216)
- rb (page 217)
- sc (page 218)
- smart (page 219)
- spare (page 219)
- spath (page 221)
- stats (page 221)
- subsys (page 222)
- sync (page 223)
- topology (page 224)
- transit (page 224)

about

Usage

about

Summary

Displays utility information.

array

Usage

array [-a <action>] [-d <DaId>] [-c <array count>] [-v] array -a add [-s "<list of array params>"] [-d <DaId>] -p <PdId list> [-c <Ld count>] [-l "<list of Ld params>"] array -a mod -d <DaId> [-s "<list of array settings>"]

array -a del -d <DaId list>

array -a locate -d <DaId>

array -a accept -d <DaId> [-t <condition type>]

array -a addld -d <DaId> [-c <Ld count>] -l "<list of ld settings>"

array -a delld -l <LdId list>

array -a transport -d <DaId>

Summary

The array command is the main command for performing advanced configuration and maintenance tasks on disk arrays.

This command lists, creates, modifies, deletes, and locates disk arrays. It also adds and deletes logical drives.

Note that you cannot mix Hard Disk Drives (HDD) and Solid State Drives (SSD) in the same disk array.

Warning

When you delete a disk array, you also delete any logical drives that belong to it, along with the data they contain.
When you initialize a logical drive, you delete all data on the logical drive.
Back up any important data before deleting a disk array or logical drive.

Options

-a <action>	Specifies the action to perform.
list	(Default) Displays a summary of all arrays, a specified number of arrays, or a specific array.
add	Adds/creates an array. This action might also create logical drives at the same time.
addld	Adds/creates a logical drive to an existing array.
delld	Deletes a logical drive from an array.
mod	Modifies array settings.
del	Deletes an array and all its associated logical drives.
locate	Locates an array.
accept	Accepts the condition of an incomplete array. Currently, there are two conditions that can cause an array to be incomplete: • "Missing Drive: one or more drives missing in the array • "Missing NVRAM Watermark The migration watermark is not found on the controller but the DDF on the array indicates that migration is in progress. When the either of the above conditions occurs, all the logical drives on the array go offline.

	You can accept the array in incomplete condition and try to bring the logical drives online. However, that is a high-risk and non-revertible operation, and it may result in data loss. Therefore, it is recommended to clear the condition first, for example: putting the missing drives back or roaming the array back to the original controller and wait until the migration completes.
transport	Takes the array and the logical drives on the array offline to get ready for transport the array to another subsystem.
-d <DA ID>	The disk array ID. Valid values are 0-255. Specifies the desired array ID when creating (add) an array. Specifies the array ID when listing array information, modifying, deleting, locating, accepting, adding or deleting a logical drive. Only one array may be specified.
-p <PD ID list>	Specifies physical drives to be used in an array, with -a add option. PD IDs are specified individually or separated by comma. Sequential group of physical drives are specified by placing a ~ between numbers such as 1~6. This will include physical drives 1, 2, 3, 4, 5, and 6.
-s "<option>=<value>	Specifies array settings when creating (add) or modifying (mod) an array. Options are comma separated.
alias=	A user-specified array name. Up to 32 characters, alpha-numeric characters, blank spaces and underscores. Beginning and ending blank spaces are discarded.
mediapatrol=	Enables or disables Media Patrol for this array.
enable	The default is enable.
disable	
pdm=	Enables or disables PDM for this array.
enable	The default is enable.
disable	
-l "<option>=<value>"	Specifies logical drive settings when adding a logical drive to an existing array (addld) or during array creation (add). Options are comma separated.
<LD ID list>	Specifies a list of Logical Drive IDs. Requires the -a delld option.
ID=	Assigns a specific ID to an array. Overrides automatic ID assignment. Valid values are 0-255.
Alias=	A user-specified name for the logical drive.
Raid=	Specifies logical drive RAID level.
0	Striping.

1	Mirroring on two drives.
5	Parity, requiring 3 or more drives.
10	Mirroring on even number of drives.
1e	Extended mirroring, requiring 2 or more drives.
50	Striping on multiple RAID 5, requiring 6 or more drives.
6	Allow two drive failure, requiring 4 or more drives.
60	Striping on multiple RAID 6, requiring 8 or more drives.
Capacity=	Specifies logical drive capacity. Can be specified in megabytes (mb), gigabytes (gb) or terabytes (tb), up to 2 decimal places. If not specified, all available capacity is used for this logical drive.
Stripe=	Specifies logical drive stripe size. Options include 64KB, 128 KB, 256 KB, 512 KB, and 1024 KB. If not specified, the default 64KB is used.
Sector=	Specifies logical drive sector size. Options include 512 B, 1 KB, 2 KB, and 4 KB. Sector size cannot exceed Stripe size. Auto-adjusted not to exceed the maximum supported sector size of the controller. See controller information on page 200. If not specified, the default 512 B is used.
WritePolicy=	Specifies logical drive write policy.
writethru	Writes are not cached
writeback	Writes are cached
ReadPolicy=	Specifies logical drive read policy.
readahead	Reads extra data to help reduce read times of sequential data.
readcache	Caches reads the data in case the same request is made again.
nocache	No caching algorithm.
Axle=	A member element when creating a RAID10 or RAID50 or RAID60. RAID10 have 2 axles, RAID50 and RAID60 may have up to 16 axles with up to 16 drives per axle.
PreferredCtrlId=	Subsystems only. Specifies which controller the LD is preferred for LUN affinity. Valid value is 1 or 2. If value is not specified, LUN affinity is auto balanced.
-c <array count>	Specifies the number of arrays to give a summary of when used with the -a list option. For example 'array -a list -c3' will give a summary for the first 3 arrays on that controller.

<Ld count>	Specifies the number of logical drives to be created with the -a add option. With the -c option, all the logical drives have same settings but only one -l option=value can be specified.
-t <condition type>	Specifies the type of incomplete condition to accept. If not specified, it will accept the current incomplete condition by default.
missingdrive	The condition of missing drive in the array.
missingwatermark	The condition of missing NVRAM watermark of the array.
-v Verbose mode.	Displays all array properties, requires -a list option.

Examples

array -v -c 1

array -a add -s "alias=MyArray,mediapatrol=enable" -p 1,3,5~9

-l "raid=5,capacity=50gb,stripe=256kb,sector=1kb"

array -a add -p 1,3,5~9 -l "raid=5,capacity=50gb,stripe=256kb"

-l "raid=0,capacity=100gb"

array -a mod -d 1 -s "alias=YourArray,mediapatrol=disable"

array -a del -d 3

array -a locate -d 0

array -a addld -d 0 -l "raid=1e,capacity=125gb,stripe=64kb"

array -a delld -l 1

battery

Usage

battery [-a <action>] [-b <batId>]

battery -a recondition -b <batId>

Summary

The battery command displays the status of a battery by the percentage of charge left.

On subsystems, this command also reconditions the battery. Reconditioning fully discharges then fully recharge the battery. The battery is reconditioned automatically once per month.

Options

-a <action>	Specifies the action to perform.
list	(Default) List information for all batteries or a specific battery.

recondition	Subsystems only. Recondition a specific battery.
-b <battery ID>	Specifies which battery in a given enclosure.
1..2	

Examples

battery

battery -a recondition -b 1

bbm

Usage

bbm [-a <action>] [-p <PdId>]

bbm -a clear -p <PdId>

Summary

The bbm command displays and clears the Bad Block Map (BBM) for all configured SATA drives.

Options

-a <action>	Specifies the action to perform.
list	(Default) List the BBM information.
clear	Clears the BBM list. For configured SATA drives only.
-p <PdId>	Specifies the physical drive id. For the -a list option, the default is all physical drives. For the -a clear option, you must specify a physical drive id.

Examples

bbm -p 1

bbm -a clear -p 3

bga

Usage

bga [-a <action>]

bga -a mod -s "<list of settings>"

Summary

The bga command displays all current background activities and makes settings each background activity.

Options

-a <action>	Specifies the action to perform.

list	(Default) Lists current background activities.
mod	Makes changes to one of the settings.
-s "<option>=<value>"	Specifies which background activity settings to change.
autorebuild=	Enable or disables auto-rebuild and auto-transition. Auto-rebuild will rebuild an array when an unconfigured drive is inserted into the slot of a dead drive. Auto-transition will start transitioning on a used revertible spare in the following condition: 1. When the rebuild has completed using the revertible spare, and 2. When an unconfigured drive is inserted into the slot of the dead drive which the was part of the array. or When a non-revertible spare has been inserted or created, and is applicable to the array. This option affects all arrays on the subsystem.
enable	
disable	
mediapatrol=	Verifies the media of the array and/or spares to find bad blocks on physical disks before you use that block. This feature is enabled and disabled on an array basis.
enable	
disable	
ReassignedBlock=	Threshold value to trigger PDM, when re-assign map exceeds the threshold value
1..512	
ErrorBlock=	Threshold value to trigger PDM, when number of medium error on the PD exceeds the threshold value.
1..2048	
<bg task>=<rate>	Background task rates determine what percentage of the IO load on the controller should be dedicated to the background task. A lower number will mean the task takes longer to complete, a higher number will cause the task to complete faster, all other things being equal.
rebuildrate=	Rebuild rate determines the rate at which rebuild will run. (low=25, medium=50, high=75)
low	
medium	
high	

pdmrate=	PDM rate determines the rate at which PDM will run. (low=25, medium=50, high=75)
low	
medium	
high	
transitionrate=	Transition rate determines the rate at which transition will run. (low=25, medium=50, high=75)
low	
medium	
high	
syncrate=	Synchronization rate determines the rate at which synchronization will run. (low=25, medium=50, high=75)
low	
medium	
high	
initrate=	Initialization rate determines the rate at which initialization will run. (low=25, medium=50, high=75)
low	
medium	
high	
rcrate=	Redundancy check rate determines the rate at which redundancy check will run. (low=25, medium=50, high=75)
low	
medium	
high	
migrationrate=	Migration rate determines the rate at which migration will run. (low=25, medium=50, high=75)
low	
medium	
high	

Examples

bga

bga -a mod -s "autorebuild=enable,rebuildrate=high,syncrate=low"

buzz

Usage

buzz [-a <action>]

buzz -a list

buzz -a enable

buzz -a disable

buzz -a on

buzz -a off

Summary

The buzz command displays the status of the buzzer, and enables, disables, turns on or turns off the buzzer.

Options

-a <action>	Specifies the action to perform.
list	(Default) List the status of the buzzer.
enable	Enable the buzzer.
disable	Disable the buzzer.
on	Turn on the buzzer.
off	Turn off the buzzer.

checktable

Usage

checktable [-t <tableType>] -l <LdId>

Summary

The checktable command displays the error check tables of a logical drive.

Options

-t <tableType>	Specifies which error table to display. The default displays all tables.
rct	Displays the read check table.
wct	Displays the write check table.
ibt	Displays the inconsistent block table.
-l <LdId>	Specifies the logical drive ID.

Examples

checktable -l 10 -t rct

checktable -l 10

config

Usage

config -a auto

config -a expr [-r y|n] [-c y|n] [-p y|n] [-m y|n] [-s y|n] [-t <AppType>] [-l <NumLd>]

Summary

The config command has two options: Automatic and Express.

Automatic configuration takes all available unconfigured physical drives to create an optimized disk array following a default set of parameters. There are no options.

Express configuration takes your input, creates one or two arrays, and spreads their capacity evenly over all of the logical drives that you specify.

The redundancy option creates redundant logical drives (RAID 1, 10, 1E, 5, 50, 6, or 60).

The capacity option enables optimizes the logical drives for capacity.

The performance option optimizes the logical drives for performance.

If you choose all three options, redundancy gets highest priority and capacity gets lowest priority.

Note that you cannot combine HDDs and SSDs in the same disk array. If your system has both type of drives, it will create separate disk array/logical drive sets for each type of physical drive.

Options

-a <action>	Specifies the action to perform.
auto	Automatic configuration with no options. Creates an optimized disk array. One or more logical drives are created automatically.
expr	Express configuration. RAID level is dependant on the options chosen.
-r <y|n>	Selects the redundancy option.
-p <y|n>	Selects the performance option.
-c <y|n>	Selects the capacity option.
-m <y|n>	Allows mixing SATA and SAS physical drives in the same array.
-s <y|n>	Includes a spare drive in the array. Note: Requires 5 or more unconfigured physical drives.
-t <AppType>	Specifies the intended application for this array.

video	Sequential large block reads.
data	Random read/write mix, small to medium sized IO.
log	Sequential small block write.
other	Random read/write mix, small to medium sized IO.
fileserver	Random read/write mix, small to medium sized IO.
-l <num of LDs>	Specifies how many logical drives to include in the configuration. Array capacity is divided evenly among the logical drives.

Examples

config -a auto

config -a expr -ry -p y -c n -sy -t data -l2

ctrl

Usage

ctrl [-a <action>] [-i <ctrlId>] [-c <ctrl count>] [-v]

ctrl -a mod [-i <ctrlId>] -s "<list of settings>"

ctrl -a clear [-i <ctrlId>] [-t <condition type>]

Summary

The ctrl command displays controller information and changes controller settings.

Options

-a <action>	Specifies the action to perform.
list	(Default) Lists controller information.
mod	Changes controller settings.
clear	Clears controller conditions.
-i <ctrl ID>	Specifies the controller ID. For subsystems with dual controllers, controller ID is required when setting alias of controller.
-c <ctrl count>	Controller count. Required for information on multiple controllers.
-s "<option>=<value>"	Specifies which settings to change.
alias=	A user-specified name for the controller. Up to 48 characters long, alpha- numeric characters, blank spaces and underscores. The beginning and ending blank spaces are discarded.

Following setting is shared if there are dual controllers:

coercion=	Enables or disables disk coercion. Disk coercion will truncate the size of the physical drives. Makes different size drives appear to be the same size. For example, a 90.1 GB drive would appear as the same size as an 89.8 GB drive. Important when using drives of different manufacturers for rebuilds or as hot spares.
enable	
disable	
coercionmethod=	The method of coercion.
GBTruncate	Truncates the drive to the nearest 1-billion byte boundary.
10GBTruncate	Truncates the drive to the nearest 10-billion byte boundary.
GrpRounding	Truncates the drive using an intelligent algorithm. Allows the maximum amount of usable space.
TableRounding	Truncates the drive using a pre-defined coercion table.
smart=	Enables or disables polling drive SMART status.
enable	
disable	
smartpollinginterval=	Sets the time interval in number of minutes to poll the drive SMART status.
1..1440	
cacheflushinterval=	Sets the time interval in seconds to flush the controller writeback cache.
1..12	
migrationstorage=	Sets location to store the migration watermark.
ddf	Uses the DDF area on the physical drives of the disk array.
nvram	Uses the NVRAM on the controller.
lunaffinity=	Subsystems only. Enables or disables LUN affinity, allowing LD access only to certain controller. For subsystems with dual controllers.
enable	
disable	
pollinterval=	Sets interval in seconds to poll enclosure SEP information.
15..255	

lunmapping=	Subsystems only. Chooses WWN based or Slot based LUN mapping method.
wwn	
slot	
adaptivewbcache=	Enables or disables adaptive writeback cache.
enable	Writeback logical drives will change the write policy based on the availability of protection. If BBU or UPS is available, the write policy is retained as Writeback, otherwise the policy is switched to Writethru.
disable	The write policy of the writeback logical drives are not changed irrespective of the availability of BBU or UPS.
hostcacheflushing=	Subsystems only. To enable or disable host cache flushing. When enabled, SYNCHRONIZE CACHE SCSI command from host is supported.

For high availability products only.

enable	
disable	

forcedreadahead=Enables or disables forced read ahead caching.

enable	
disable	
commonwwnn=	Enables or disables common WWNN. For subsystems with dual controllers.
enable	All controllers report one common WWNN.
disable	Each controller reports its own WWNN.
alua=	Subsystems only. Enables or disables asymmetric logical unit access. Enabling ALUA will enable LUN affinity automatically.
enable	
disable	
-t <condition type>	Specifies the type of condition to clear. Valid only when the command action is "clear".
watermark	Watermark, the only supported condition for now. Used with the -a clear option to clear an orphan migration watermark in the controller NVRAM. This action only works when migration storage is set to NVRAM prior to starting migration.
-l	Displays the id of the controller on whose serial port the CLI is running.
-v	Verbose mode. Used with the -a list option.

Examples

ctrl

ctrl -v

ctrl -l

ctrl -a mod -i 1 -s "alias=ctrl1, coercion=enable"

date

Usage

date

date -a mod [-d <date>] [-t <time>]

Summary

The date command displays the system time and date, and changes these settings.

Options

-a <action>	Specifies the action to perform.
list	(Default) Displays the current system time.
mod	Modifies the current system time. Not supported for HBA products.
-d <date>	Specifies the date in the following format: yyyy/mm/dd where month's range is 1-12 and day's range is 1-31.
-t <time>	Specifies the time in the following format: hh:mm:ss where hour range is 0-23, minute and second range is 0-59.

Examples

date

date -a mod -d 2004/02/25 -t 14:50:05

enclosure

Usage

enclosure [-a <action>] -v

enclosure -a mod [-e <encl id>] -s <list of settings>

enclosure -a locate [-e <encl id>] [-t <FRU type> -f <FRU id>]

Summary

The enclosure command provides status and information about the various components of the enclosure unit. It is also sets temperature threshold values for JBOD enclosures and displays Vendor Provided Data (VPD).

Options

-a <action>	Specifies the action to perform.
list	(Default) Displays information and status of the enclosure.
mod	Modifies settings. Requires the -s option.
locate	Locates an enclosure by flashing its LEDs.
-e <encl id>	Enclosure ID. The default value is 1 if unspecified. For list action, the default is for all enclosures if unspecified.
-s "<option>=<value>"	Specifies the settings to change. Applies to the JBOD enclosures only.
tempwarning=	Enclosure warning theshold temperature, in degrees Celsius.
10..51	
tempcritical=	Enclosure critical theshold temperature, in degrees Celsius.
52..61	
ctrltempwarning=	Controller warning theshold temperature, in degrees Celsius.
10..61	
ctrltempcritical=	Controller critical threshold temperature, in degrees Celsius.
62..71	
-t <FRU type>	Specifies which type of FRU to locate. Requires -a locate option.
ctrl	Locates the controller.
cooling	Locates the cooling unit. Only works with SAS type enclosure.
psu	Locates the power supply unit. Only works with SAS type enclosure.
-f <FRU id>	Specifies id of FRU to locate. Requires -a locate option. Valid values are 1 and 2.
-v	Verbose mode. Requires -a list option. VPD information is displayed.

Examples

enclosure

enclosure -v

enclosure -a mod -e 10 -s "tempwarning=35, tempcritical=45"

event

Usage

event [-a <action>] [-l <location>] [-i <SeqNo>] [-c <event count>] [-v]

event -a clear [-l <location>]

Summary

The event command displays and clears the RAM and NVRAM event logs.

Options

-a <action>	Specified the action to perform.
list	Displays the events for the specified location. RAM events are displayed if no location is specified.
clear	Clear events for a specified location.
-l <location>	Specifies the location from which to display or clear events.
ram	All events are stored in RAM. These events are lost after rebooting.
nvram	Some events are also stored in NVRAM. These events remain after rebooting and are a subset of the RAM events.
-i <sequence ID>	Specifies a specific event by its sequence number. This is a starting point. Requires the -a list option. You can use the -c option.
-c <event count>	Specifies the number of events to retrieve when displaying events.
-v	Verbose mode. Requires the -a list option.

Examples

event

event -v

event -l nvram

event -a clear -lnvram

event -c 200

event -a list -i852 -c200

export

Usage

export -t <fileType> [-s <tftpServer>] [-p <port>] -f <fileName>

Summary

The export command exports certain types of configuration files to a remote or local host.

This command only affects subsystems.

Options

-t <file type>	Specifies the type of file to export.
userdb	User database file. This file type is not applicable for in-band and can only be exported to a remote host.
servicereport	System service report file. This file is exported to remote host for embedded and local host for in-band.
-f <file name>	Specifies the name of the file to be exported.
-s <TFTP server>	Specifies TFTP server's IP or host name. Do not specify TFTP server for in-band.
-p <port num>	The port number of the TFTP server. Default is 69. Do not specify port number for in-band.

Examples

export -t userdb -s 192.168.1.1 -f userdb.bin

export -t servicereport -s 192.168.1.1 -f servicereport # for embedded

export -t servicereport -f servicereport # for in-band

factorydefaults

Usage

factorydefaults -a <action> -t <type>

Summary

The factorydefaults command restores factory default settings.

Options

-a <action>	Specifies the action to perform.
restore	Restore the factory default settings.
-t <type>	Specifies the type of settings to restore.
all	All settings.
allfw	All firmware settings.

allsw	Subsystems only. All software settings.

Following are individual Firmware settings:

bga	Background activity settings.
ctrl	Controller settings.
encl	Enclosure settings, including temperature thresholds.
fc	Subsystems only. FC port settings.
iscsi	Subsystems only. iscsi settings, including node, port, SLP, and iSNS.
netiscsi	Subsystems only. Network settings of iSCSI ports.
netmgmt	Subsystems only. Network settings of management ports.
phydrv	Physical drive settings.
sas	Subsystems only. SAS host interface port setting.
scsi	Subsystems only. Parallel SCSI channel settings.
subsys	Subsystem settings.

Following are individual Software settings, which only apply to Subsystems:

bgascheduler	Background activity scheduler settings.
service	Service startup type settings.
webserver	Web server settings.
snmp	SNMP settings.
telnet	Telnet settings.
email	Email settings.
netsend	Netsend settings.
cim	CIM settings.
user	User settings.

Examples

factorydefaults -a restore -t phydrv

factorydefaults -a restore -t all

init

Usage

init [-a <action>] [-l <LdId>]

init -a start -l <LdId> [-q <size>] [-p <pattern>]

init -a stop -l <LdId>

init -a pause -l <LdId>

init -a resume -l <LdId>

Summary

The init command starts, stops, pauses, and resumes a logical drive initialization.

A full initialization writes to the entire logical drive space and takes several minutes, depending on the size of the logical drive.

A quick initialization writes to the first and last few megabytes of the logical drive. Typically, a quick initialization is completed in moments.

Warning

When you initialize a logical drive, you delete all data on the logical drive. Backup any important data before you initialize a logical drive!

Options

-a <action>	Specifies the action to perform.
list	Displays a list of the initializations in progress or paused and their status. The default action.
start	Start an initialization.
stop	Stop an initialization.
pause	Pause an initialization.
resume	Resume an initialization.
-l <LD ID>	Specifies the logical drive to be initialized.
-q <size>	Specifies the amount of data in megabytes (MB) for a quick initialization.
1..1024	
-p <pattern>	Specifies the pattern for a full initialization. The pattern can range from 1 to 128 bytes (HEX string), and is padded to even number of bytes, such as, fff padded to 0fff. Pattern is not supported for quick initialization.

Examples

init

init -a stop -l0

init -a start -l0 -p5a5a0101

logdrv

Usage

logdrv [-a <action>] [-l <LdId>] [-c <Ld count>] [-v]

logdrv -a locate -l <LdID>

logdrv -a mod -l <LdId> -s "<list of ld settings>"

Summary

The logdrv command displays information about the logical drives and changes logical drive settings.

To create a logical drive, see the array command on page 190.

Options

-a <action>	Specifies the action to perform.
list	(Default) Displays a summary of one or more logical drives.
mod	Changes logical drive settings.
locate	Locates a logical drive within the enclosure by flashing drive carrier LEDs.
-l [<LD ID>]	Logical drive ID.
-c [<LD count>]	Logical drive count. Requires the -a list option.
-s ["<option>=<value>"]	Specifies the logical drive settings to change.
alias=	A user-specified name for the logical drive. Up to 32 characters, containing alpha-numeric characters, blank spaces and underscores. Beginning and ending blank spaces are discarded.
WritePolicy=	Specifies logical drive write policy.
writethru	Writes are not cached.
writeback	Writes are cached. Note: Cannot be set if ReadPolicy is set to “nocache.”
ReadPolicy=	Specifies logical drive read policy.
readahead	Reads extra data to help reduce read times of sequential data.
readcache	Caches reads in the case the same request is made again.
nocache	No caching algorithm.
PreferredCtrlId=	Specifies which controller the LD is prefers for LUN affinity. Valid value is 1 or 2.
-v	Verbose mode. Used with -a list.

Examples

logdrv

logdrv -v

logdrv -a mod -l0 -s "readpolicy=readahead"

logdrv -a locate -l2

migrate

Usage

migrate [-a <action>] [-d <DaId>]

migrate -a start -d <DaId> -p <PdIds> -l <LdSettings>

Summary

The migrate command expands the capacity of a logical drives (online capacity expansion) and changes logical drive RAID levels (RAID level migration).

Note that the added drives must be the same media type, HDD or SSD, as the other physical drives in the disk array.

Options

-a <action>	Specifies the action to perform.
list	(Default) Displays the migration status of specified disk array. If no array ID specified, all migration statuses are displayed.
start	Starts the migration.
-d <DA ID>	Specifies the ID of the array to be migrated.
-p <PD ID list>	Specifies the physical drives to be added to the array.
-l "<option>=<value>"	Specifies logical drive migration settings.
id=	(Required) Specifies the logical drive ID.
capacity=	Specifies the new logical drive capacity. Specify a value only when expanding logical drive capacity.
raid=	Specifies the new RAID level. Note: When expanding a RAID 10 logical drive, specify RAID 10 as the target RAID level, otherwise the resulting logical drive is a RAID 1E.
axle=	Specifies the axle number. Applies to RAID 50 and 60 when the RAID Level is changed.
stripe=	Specifies the new stripe size. Not currently supported.

Examples

migrate -d 1

migrate -a start -d 1 -p 10 -l "id=0,capacity=10gb"

mp

Usage

mp -a <action>

Summary

The mp command activates Media Patrol. Media Patrol searches the physical drives for media errors. When an error is found, Media Patrol attempts to repair the error. If it fails to correct the error, Media Patrol attempts to remap the sector. Note: Sector remapping is not currently supported.

You can start, stop, pause, or resume Media Patrol and monitor its progress and status.

Options

-a <action>	Specifies the action to perform.
list	(Default) Displays the status and progress of Media Patrol.
start	Starts Media Patrol.
stop	Stops Media Patrol.
pause	Pauses Media Patrol.
resume	Resumes a paused Media Patrol.

Examples

mp

mp -a stop

mp -a resume

pdm

Usage

pdm [-a <action>] [-d <DaId>] [-s <SeqNo>]

pdm -a start -d <DaId> -s <SeqNo> -p <PdId>

pdm -a stop -d <DaId> -s <SeqNo>

pdm -a pause -d <DaId> -s <SeqNo>

pdm -a resume -d <DaId> -s <SeqNo>

Summary

The pdm command activates Predictive Data Migration (PDM). PDM replaces a suspect physical drive, such as a drive with a PFA condition, with a different drive. The replacement drive can be an unconfigured drive, a global spare, or a dedicated spare to this disk array.

During PDM, the data on the suspect drive is transferred to the replacement drive while the logical drive remains online.

After PDM, the replacement drive becomes part of the disk array. The suspect drive become unconfigured and any PFA condition remains on it.

This command starts, stops, pauses, and resumes a PDM and monitors the progress of a running PDM.

A PFA drive cannot be used until you clear the PFA condition. To clear the PFA conditon of a physical drive, please refer to phydrv command on page 212.

Note that the destination drive must be the same media type, HDD or SSD, as the other physical drives in the disk array.

Options

-a <action>	Specifies the action to perform.
list	(Default) Displays the active and paused PDMs and their status.
start	Starts a manual PDM.
stop	Stops a PDM.
pause	Pauses a PDM.
resume	Resumes a paused PDM.
-d <DA ID>	Specifies which disk array on which to perform the PDM.
-s <sequence Num>	Specifies the sequence number of the suspect drive.
-p <PD ID>	Specifies physical drive ID of the replacement drive.

Examples

pdm

pdm -a start -d0 -s2 -p10

pdm -a stop -d0 -s2

phydrv

Usage

phydrv [-a <action>] [-p <PdId>] [-c <Pd count>] [-v]

phydrv -a mod -p <PdId> -s "<list of settings>"

phydrv -a locate -p <PdId>

phydrv -a online -p <PdId>

phydrv -a offline -p <PdId>

phydrv -a clear -t <condition type> -p <PdId>

Summary

The phydrv command displays physical drive information, changes physical drive settings, locates individual drives, and forces a drive to an online or offline state.

Options

-a <action>	Specifies the action to perform.
list	(Default) Displays all physical drives, their make, model number, and array they belong to. Their status is also shown.
mod	Modifiies physical drive settings.
locate	Flashes the physical drive's LED so you can location it.
online	Forces a drive from an Offline to an Online state. **Caution:** Do this action only in extreme conditions. It causes data corruption in most cases.
offline	Forces a drive from an Onine to an Offline state.
clear	Clears a drive's condition.
-p <PD ID>	Specifies the physical drive ID.
-c <count>	Specifies number of drives when their ID numbers are sequential.
-t <condition type>	Specifies type of condition to clear. Requires the -a clear option.
pfa	Clears a PFA condition on the drive.
staleconfig	Clears a stale configuration on the drive.
-d <drive type>	Specifies type of settings to modify. Requires the -a mod option. Defaults to be all if -d is not specified.
sata	SATA related setting(s): writecache, rlacache, and cmdqueuing. The SATA settings apply to all SATA physical drives.
sas	SAS related setting(s): writecache, rlacache, readcache. The SAS settings apply to all SAS physical drives.
all	Apply to both SATA and SAS drives where is applicable.
-s "<option>=<value>"	Specifies which settings to change.
alias=	User-specified name, only for configured physical drives. Up to 32 characters, containing alpha- numeric characters, blank spaces and underscores. Beginning and ending blank spaces are discarded.

The following global settings are for physical drives that support these features:

writecache= Enables or disables write cache on the physical drive(s).

- enable
- disable

rlacache= Enables or disables read look ahead cache on the physical drive(s).

- enable
- disable

cmdqueuing= Enables or disables command queuing on the physical drive(s).

- enable
- disable

temppollint=Drive temperature polling interval in seconds. If value is 0, polling is disabled. For subsystems with dual controllers.

- 15..255

mediumerrorthreshold=

Medium error threshold. If the threshold is reached, the physical drive is marked as dead. The default value is 0, indicating that physical drive is not marked as dead for medium errors. For subsystems with dual controllers.

- 0..4294967294

The following settings are only for SATA drives:

dmamode= For SATA drive only. Attempt to negotiate at the specified DMA transfer mode. If a DMA transer mode cannot be negotiate, the next slower mode is attempted until a mode can be negotiated (udma5, udma4....udma0, mdma 2.....mdma0).

- udma0 Ultra DMA Mode 0
- udma1 Ultra DMA Mode 1
- udma2 Ultra DMA Mode 2
- udma3 Ultra DMA Mode 3
- udma4 Ultra DMA Mode 4
- udma5 Ultra DMA Mode 5
- mdma0 Multi DMA Mode 0
- mdma1 Multi DMA Mode 1
- mdma2 Multi DMA Mode 2

speed= Set the speed of physical drive(s).

1.5gb	1.5 Gb/s
3gb	3 Gb/s
auto	Automatic

The following settings are only for SAS drives:

readcache=	Applied to SAS drive only. Enables or disables read cache on the physical drive(s).
enable	
disable	
-v	Verbose mode. Used with -a list.

Examples

phydrv

phydrv -v

phydrv -a locate -p 9

phydrv -a mod -s "writecache=enable,rlacache=enable"

phydrv -a offline -p 8

phydrv -a online -p 8

ptiflash

Usage

ptiflash [-a <action>] [-t] [-s <ServerName>] -f <FileName> [-p <PortNum>]

ptiflash -f <FileName>

Summary

The ptiflash command is a flash update utility that installs flash image files on:

- Firmware and BIOS on a SuperTrak controller card
- Firmware on a VTrak JBOD enclosure

You must first download the update file and save it to the Host PC. See “Downloading BIOS and Firmware File” on page 289.

Note that this function does not update the software *driver*. Install the software driver file following the procedure for your operating system. See “Chapter 3: Installing Drivers” on page 63

Cautions

- Before you begin, backup any important or useful data.
- Do NOT power off your PC during the procedure.

Options

-a <action>	Specifies the action to perform.
start	(Default) Starts the flash process. Note: Run only one flash process at a time.
versioninfo	Subsystems only. Displays the version and build information of all the flash images of all controllers or the specified controller.
-t	Subsystems only. Specifies a TFTP server. Required for embedded subsystems.
-s <servername|ipaddress>	Subsystems only. Specifies the hostname or the IP address of the TFTP server which contains the flash image file.
-f <filename>	Specifies the filename of the flash image file.
-p <port number>	Subsystems only. Specifies the port number of the TFTP server. If no port number is given, the default value of 69 is used.

Examples

ptiflash -f fw_multi_20051022.img [for SuperTrak controllers]

ptiflash -t -s 192.168.1.1 -f fw_multi_20031010.img -p 69 [for embedded Subsystems]

ptiflash -f fw_multi_20031010.img [for in-band Subsystems]

rc

Usage

rc [-a <action>] [-l <LdId>]

rc -a start -l <LdId> [-n] [-p]

rc -a stop -l <LdId>

rc -a pause -l <LdId>

rc -a resume -l <LdId>

Summary

Th rc command starts, stops, pauses and resumes a Redundancy Check and monitors the progress of a running Redundancy Check.

Options

-a <action>	Specifies action to perform.

list	(Default) Displays active and paused Redundancy Checks and their status.
start	Starts a Redundancy Check.
stop	Stops a Redundancy Check.
pause	Pauses a Redundancy Check.
resume	Resumes a paused Redundancy Check.
-l <Ld ID>	Specifies the logical drive ID on which to run the Redundancy Check.
-n	Do not fix inconsistent data. This option causes Redundancy Check to run without correcting inconsistent data. All inconsistency errors are reported.
-p	Pause on error. This option causes Redundancy Check to pause when it encounters inconsistent data. The default is to continue on error.

Examples

rc

rc -a start -l3 -n -p

rc -a start -l3

rc -a stop -l2

rb

Usage

rb [-a <action>] [-d <DaId>] [-s <SeqNo>]

rb -a start -d <DaId> -s <SeqNo> -p <PdId>

rb -a stop -d <DaId> -s <SeqNo>

rb -a pause -d <DaId> -s <SeqNo>

rb -a resume -d <DaId> -s <SeqNo>

Summary

The rb command starts, stops, pauses, and resumes a Rebuild and monitors the progress of a running Rebuild.

Note that the replacement drive must be the same media type, HDD or SSD, as the other physical drives in the disk array.

Options

-a <action>	Specifies action to perform.
list	(Default) Displays the running and paused Rebuilds and their status.

start	Starts a manual Rebuild.
stop	Stops a Rebuild.
pause	Pauses a Rebuild.
resume	Resumes a paused Rebuild.
-d <DA ID>	Specifies which disk array on which to perform the Rebuild.
-s <sequence Num>	Specifies the sequence number of the failed physical drive. The source drive of the Rebuild.
-p <PD ID>	Specifies the ID of the replacement physical drive. The target drive of the Rebuild.

Examples

rb

rb -a start -d0 -s2 -p10

rb -a stop -d0 -s2

sc

Usage

sc [-a <action>] [-i <SpareId>]

sc -a start [-i <SpareId>]

Summary

The sc command starts a Spare Check and monitors the status of a running Spare Check.

Options

-a <action>	Specifies the action to perform.
list	(Default) Displays Spare Check status.
start	Starts the Spare Check.
-i <Spare ID>	Specifies the spare ID on which to run Spare Check. Valid value range is 0~255.

Examples

sc

sc -a start -i 3

smart

Usage

smart [-a <action>] [-p <PdId>]

Summary

The smart command runs the S.M.A.R.T. diagnostic tool for physical drives.

Options

-a <action>	Specifies the action to perform.
list	(Default) Displays the status of the S.M.A.R.T. diagnostic tool.
enable	Enable S.M.A.R.T.
disable	Disable S.M.A.R.T.
-p <PdID>	Specifies the physical drive ID of the drive running the S.M.A.R.T. diagnostic tool.
-v	Verbose mode. Used with -a list.

Examples

smart

smart -v

smart -a list -p 1

smart -a enalbe -p 1

spare

Usage

spare [-a <action>]

spare -a list [-i <SpareId>] [-d <DaId>] [-v]

spare -a add [-i <SpareId>] -p <PdId> [-t g|d] [-r y|n] [-d <DaId list>] [-s "<list of settings>"]

spare -a mod -i <SpareId> [-t g|d] [-r y|n] [-d <DaId list>] [-s "<list of settings>"]

spare -a del -i <SpareId>

Summary

The spare command displays a list of hot spare drives and creates, modifies, and deletes hot spare drives.

A global hot spare can replace a failed drive from any redundant disk array.

A dedicated hot spare is assigned to one or more redundant disk arrays, and can only replace a drive that belongs to one of the assigned arrays.

A revertible hot spare can be transitioned back to spare status after it replaces a failed drive in a disk array. See transit on page 224.

The hot spare drive must be of equal or greater size than the drive it replaces.

The spare drive must be the same media type, HDD or SSD, as the other physical drives in the disk array.

Options

-a <action>	Specifies the action to perform.
list	(Default) Displays a list of hot spare drives.
add	Adds new hot spare drives.
mod	Changes hot spare drive settings.
del	Deletes a hot spare drive.
-i <Spare Id>	Specifies the ID of the spare drive.
-p <PD ID>	Specifies the ID of the physical drive. Requires the -a add option to configure a drive as a spare.
-d <DA ID or DA ID List>	Specifies the disk array ID. Requires the -a list option. Displays a list of global spares and spares dedicated to this disk array. When used with other actions, it specifies the disk array IDs to which this spare is dedicated.
-t <type>	Specifies the type of hot spare drive.
g	A global hot spare drive.
d	A dedicated hot spare drive.
-r <revertible>	Specifies whether the spare drive is revertible.
y	Yes.
n	No.
-s "<option>=<value>"	Specifies options for the spare drive.
mediapatrol=	Enables or disables Media Patrol.
enable	
disable	

Examples

spare

spare -a add -p 14 -t g -r y

spare -a mod -i 1 -t d -d 0,1 -s "mediapatrol=disable"

spare -a del -i 0

spath

Usage

spath [-a list] [-t <type> -p <path #>] [-c <count>]

spath -a discover

spath -a chgpath [-t <type> -p <path #>]

Summary

The spath command discovers and changes subsystem paths.

Options

-a <action>	Which action to perform.
list	(Default) Lists the subsystem paths that have been discovered.
discover	Discovers subsystem paths.
chgpath	Changes the current subsystem path to the new specified path. If -t <type> -p <path #> is not specified, it will list the current subsystem path.
-t <type>	Specifies the type of path.
hba	HBA.
subsys	Subsystem. With the -a list option, the default is both HBA and Subsystem. With the -a chgpath options, you must specify -t and -p to change the path. You cannot use the -t option with the -a discover option.
-p <path number>	Specifies the path number of the HBA and subsystem. The path number starts from 1.
-c <count>	Specifies the number of paths to be displayed. Not currently supported.

Examples

spath

spath -a discover

spath -a chgpath -t subsys -p 1

stats

Usage

stats [-t <type>] [-i <devId>] [-c <Count>]

stats -a clear

Summary

The stats command displays statistics of subsytem, controller, enclosure, physical drives, and logical drives; and resets the statistics count to zero.

Options

-a <action>	Specifies the action to perform.
list	(Default) Displays the statistics.
clear	Resets the statistics count to zero.
-t <type>	Specifies the device type.
ctrl	Controller.
logdrv	Logical drive.
phydrv	Physical drive.
all	All the above options.
-i <devId>	Specifies the device ID. Default is the first available device ID.
-c <Count>	Specifies the device count. Default is all devices.

Examples

stats -t logdrv -i 0 -c 5

stats -a list -t all

stats -a clear

subsys

Usage

subsys [-a <action>] [-v]

subsys -a mod -s "<list of settings>"

subsys -a lock [-r] [-t <number of minutes>]

subsys -a unlock [-f]

subsys -a chklock

Summary

The subsys command displays and changes subsystem settings and locks the subsystem so that only you can make modifications.

Options

-a <action>	Specifies the action to perform.

list	(Default) Displays information for the specified subsystem.
mod	Modifies subsystem settings.
lock	Locks the subsystem so other users cannot apply changes. Other users must wait for you to unlock the system or for your lock to expire.
unlock	Clears a subsystem lock.
chklock	Checks the status of the lock.
-s "<option>=<value>"	Specifies which subsystem settings to change.
alias=	User-specified name for the subsystem. Up to 48 characters, alpha-numeric characters, blank spaces and underscores. Beginning and ending blank spaces are discarded.
-t <number of mins>	Specifies the number minutes to lock the subsystem. Requires the -a lock option. Default is 30 minutes.
-r	Renews the lock timer. Requires the -a lock and -t <number of mins> options.
-f	Specifies a forced unlock. Requires super user privilege.
-v	Specifies verbose mode.

Examples

subsys

subsys -v

subsys -a mod -s "alias=MySubsystem"

subsys -a lock -t 60

subsys -a lock -r -t 35

subsys -a unlock

subsys -a chklock

sync

Usage

sync [-a <action>] [-l <LdId>]

Summary

The sync command monitors the progress of background synchronization.

Background synchronization makes logical drive consistent. It starts automatically when a redundant logical drive is created. But unlike initialization, background synchronization allows read and write operations on the logical drive.

If an initialization starts, the background synchronization pauses until the initialization has finished.

Since background synchronization is starts, pauses, and resumes automatically, there is no need for start, stop, pause, or resume functions.

Options

-a <action>	Specifies the action to perform.
list	(Default) Displays the current background synchronization activities and their status.
-l	Specifies the logical drive ID on which background synchronization is running.

Examples

sync

sync -l3

sync -a list -l3

topology

Usage

topology [-a <action>] [-v]

Summary

The topology command displays enclosure topology, physical connections, and devices. For products that support multiple enclosures only.

Options

-a <action>	Specifies the action to perform.
list	(Default) Displays topology information.
-v	Displays complete information about topology.

Examples

topology

transit

Usage

transit [-a <action>] [-d <DaId>] [-s <SeqNo>]

transit -a start -d <DaId> -s <SeqNo> -p <PdId>

transit -a stop -d <DaId> -s <SeqNo>

transit -a pause -d <DaId> -s <SeqNo>

transit -a resume -d <DaId> -s <SeqNo>

Summary

The transit command starts, stops, pauses, and resumes a transition and monitors the progress of a running transition.

Transition is an operation to replace a revertible spare drive currently used in a disk array with an new physical drive, so the reveritible spare can be restored to spare drive status. The destination drive can be an unconfigured drive, a non-revertible global spare, or a non-revertible spare dedicated to the array.

During transition, the data on the revertible spare is transferred to the destination drive while the disk array remains online. After transition, the destination drive becomes the part of the array and the revertible spare is a spared drive once again.

Note that the destination drive must be the same media type, HDD or SSD, as the other physical drives in the disk array.

Options

-a <action>	Specifies the action to perform.
list	(Default) Displays the running and paused transitions and their status.
start	Starts a manual transition.
stop	Stops a transition.
pause	Pauses a transition.
resume	Resumes a paused transition.
-d <DA ID>	Specifies the id of disk array which contains the revertible spare drive.
-s <sequence Num>	Specifies the sequence number of the revertible spare drive in the array.
-p <PD ID>	Specifies the physical drive ID of the destination drive.

Examples

transit

transit -a start -d 0 -s 2 -p 10

transit -a stop -d 0 -s 2

Chapter 7: Technology Background

- Introduction to RAID (below)
- Choosing a RAID Level (page 240)
- Choosing Stripe Block Size (page 244)
- Choosing Sector Size (page 244)
- Choosing Cache Policy (page 245)
- Capacity Coercion (page 246)
- Initialization (page 247)
- Hot Spare Drive (page 248)
- Partition and Format the Logical Drive (page 248)
- RAID Level Migration (page 248)
- Media Patrol (page 255)
- Predictive Data Migration (PDM) (page 255)
- Transition (page 256)

Introduction to RAID

RAID (Redundant Array of Independent Disks) allows multiple physical drives to be combined together in a disk array. Then all or a portion of the disk array is formed into a logical drive. The operating system sees the logical drive as a single storage device, and treats it as such.

The RAID software and controller manage all of the individual drives. The benefits of a RAID can include:

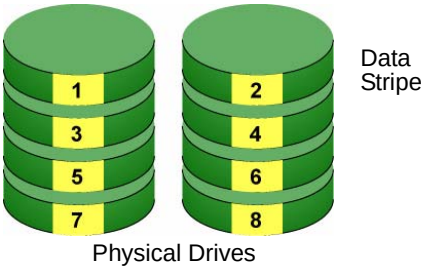
- Higher data transfer rates for increased server performance
- Increased overall storage capacity for a single drive designation (such as, C, D, E, etc.)
- Data redundancy/fault tolerance for ensuring continuous system operation in the event of a hard drive failure

Different types of logical drives use different organizational models and have varying benefits. Also see “Choosing a RAID Level” on page 240. The following outline breaks down the properties for each type of RAID logical drive:

RAID 0 – Stripe

When a logical drive is striped, the read and write blocks of data are interleaved between the sectors of multiple physical drives. Performance is increased, since the workload is balanced between drives or “members” that form the logical drive. Identical drives are recommended for performance as well as data storage efficiency.

Figure 1. RAID 0 Striping interleaves data across multiple drives



The logical drive's data capacity equals the capacity of the smallest physical drive times the number of physical drives. For example, one 100 GB and three 120 GB drives will form a 400 GB (4 x 100 GB) logical drive instead of 460 GB.

If physical drives of different capacities are used, there will also be unused capacity on the larger drives.

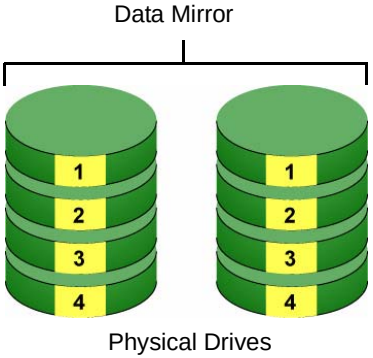
RAID 0 logical drives on SuperTrak consist of one or more physical drives.

RAID 1 – Mirror

When a logical drive is mirrored, identical data is written to a pair of physical drives, while reads are performed in parallel. The reads are performed using elevator seek and load balancing techniques where the workload is distributed in the most efficient manner. Whichever drive is not busy and is positioned closer to the data will be accessed first.

With RAID 1, if one physical drive fails or has errors, the other mirrored physical drive continues to function. Moreover, if a spare physical drive is present, the spare drive will be used as the replacement drive and data will begin to be mirrored to it from the remaining good drive.

Figure 2. RAID 1 Mirrors identical data to two drives



The logical drive's data capacity equals the smaller physical drive. For example, a 100 GB physical drive and a 120 GB physical drive have a combined capacity of 100 GB in a mirrored logical drive.

If physical drives of different capacities are used, there will be unused capacity on the larger drive.

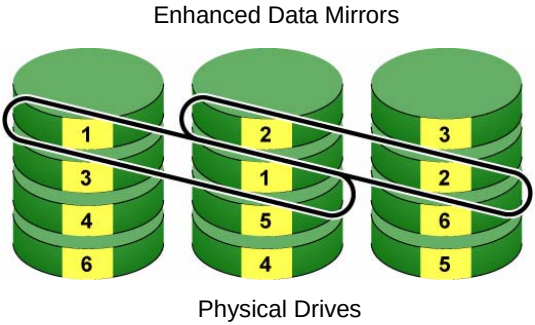
RAID 1 logical drives on SuperTrak consist of two physical drives.

If you want a mirrored logical drive with more than two physical drives, see "RAID 1E – Enhanced Mirror" on page 230 and "RAID 10 – Mirror / Stripe" on page 233.

RAID 1E – Enhanced Mirror

RAID 1E offers the security of mirrored data provided by RAID 1 plus the added capacity of more than two physical drives. It also offers overall increased read/write performance plus the flexibility of using an odd number of physical drives. With RAID 1E, each data stripe is mirrored onto two physical drives. If one drive fails or has errors, the other drives continue to function, providing fault tolerance.

Figure 3. RAID 1E can mirror data over an odd number of drives



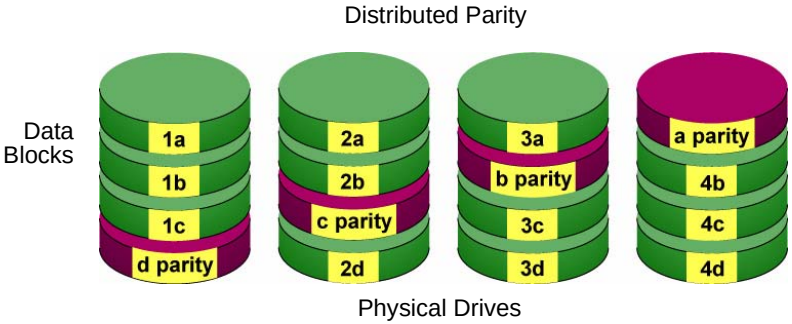
The advantage of RAID 1E is the ability to use an odd number of physical drives, unlike RAID 1 and RAID 10. You can also create a RAID 1E Logical Drive with an even number of physical drives. However, with an even number of drives, you will obtain somewhat greater security with comparable performance using RAID 10.

RAID 1E logical drives consist of three or more physical drives. You can create an array with just two physical drives and specify RAID 1E. But the resulting array will actually be a RAID 1.

RAID 5 – Block Striping with Distributed Parity

RAID 5 organizes block data and parity data across the physical drives. Generally, RAID Level 5 tends to exhibit lower random write performance due to the heavy workload of parity recalculation for each I/O. RAID 5 is generally considered to be the most versatile RAID level. It works well for file, database, application and web servers.

Figure 4. RAID 5 stripes all drives with data and parity information



The capacity of a RAID 5 logical drive equals the smallest physical drive times the number of physical drives, minus one. Hence, a RAID 5 logical drive with four 100 GB physical drives will have a capacity of 300 GB. A RAID 5 logical drive with two 120 GB physical drives and one 100 GB physical drive will have a capacity of 200 GB.

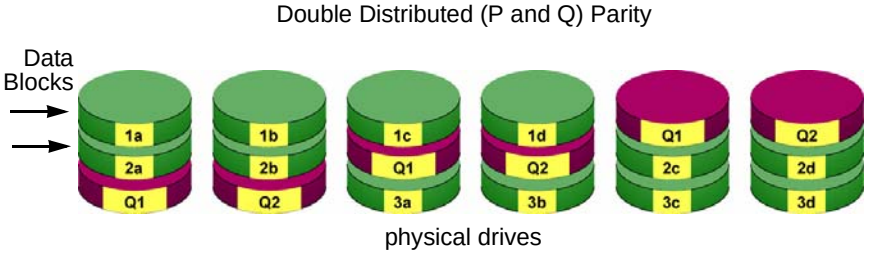
RAID 5 is generally considered to be the most versatile RAID level.

A RAID 5 on SuperTrak consists of 3 to 16 physical drives.

RAID 6 – Block and Double Parity Stripe

RAID level 6 stores dual parity data is rotated across the physical drives along with the block data. A RAID 6 logical drive can continue to accept I/O requests when any *two* physical drives fail.

Figure 5. RAID 6 stripes all drives with data and dual parity



The total capacity of a RAID 6 logical drive is the smallest physical drive times the number of physical drives, minus two.

Hence, a RAID 6 logical drive with (7) 100 GB physical drives will have a capacity of 500 GB. A RAID 6 logical drive with (4) 100 GB physical drives will have a capacity of 200 GB.

RAID 6 becomes more capacity efficient in terms of physical drives as the number of physical drives increases.

RAID 6 provides double fault tolerance. Your logical drive remains available when up to *two* physical drives fail.

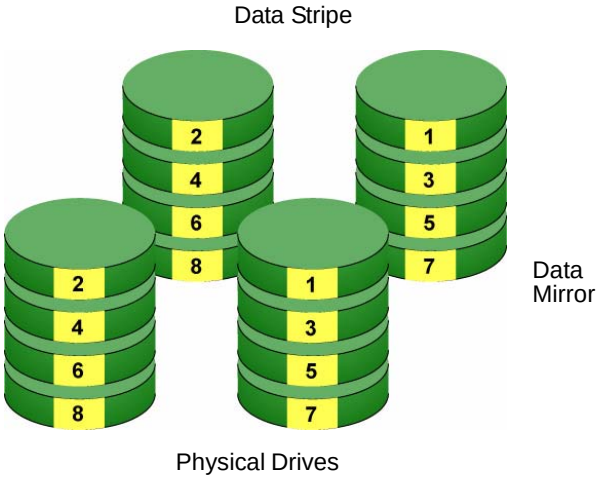
RAID 6 is generally considered to be the safest RAID level.

A RAID 6 on SuperTrak consists of 4 to 16 physical drives.

RAID 10 – Mirror / Stripe

Mirror/Stripe combines both of the RAID 0 and RAID 1 logical drive types. RAID 10 is similar though not identical to RAID 0+1. It can increase performance by reading and writing data in parallel while protecting data with duplication. The data on one drive pair is mirrored together, then striped over a second drive pair.

Figure 6. RAID 10 takes a data mirror on one drive pair and stripes it over a second drive pair



The data capacity RAID 10 logical drive equals the capacity of the smallest physical drive times the number of physical drives, divided by two.

In some cases, RAID 10 offers double fault tolerance, depending on which physical drives fail.

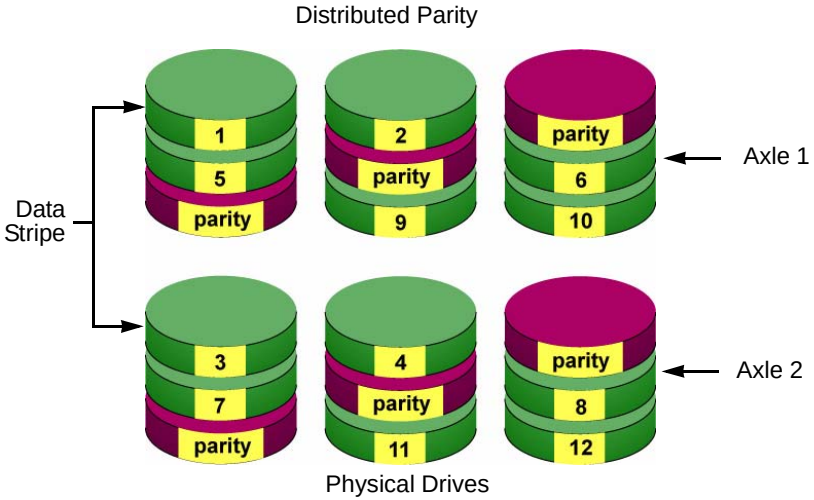
RAID 10 arrays require an even number of physical drives and a minimum of four.

For RAID 10 characteristics with an odd number of physical drives, use RAID 1E. See page 230.

RAID 50 – Striped Distributed Parity

RAID 50 combines both RAID 5 and RAID 0 features. Data is striped across physical drives as in RAID 0, and it uses distributed parity as in RAID 5. RAID 50 provides data reliability, good overall performance, and supports larger volume sizes.

Figure 7. RAID 50 is a combination of RAID 5 and RAID 0



The data capacity RAID 50 logical drive equals the capacity of the smallest physical drive times the number of physical drives, minus two.

RAID 50 also provides very high reliability because data is still available even if multiple physical drives fail (one in each axle). The greater the number of axles, the greater the number of physical drives that can fail without the RAID 50 logical drive going offline.

Component	Minimum	Maximum
Number of Axles	2	16
Physical Drives per Axle	3	16
Physical Drives per Logical Drive	6	256

RAID 50 Axles

When you create a RAID 50, you must specify the number of axles. An axle refers to a single RAID 5 logical drive that is striped with other RAID 5 logical drives to make RAID 50. An axle can have from 3 to 16 physical drives, depending on the number of physical drives in the logical drive.

The chart below shows RAID 50 logical drives with 6 to 16 physical drives, the available number of axles, and the resulting distribution of physical drives on each axle.

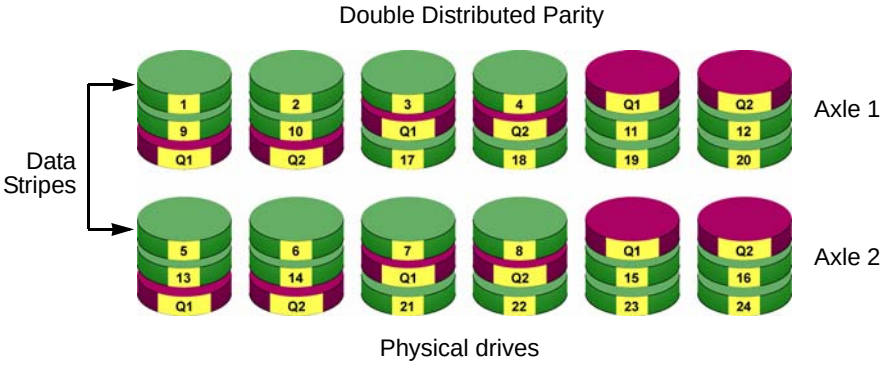
RAID 50 Logical Drive		
No. of Drives	**No. of Axles**	**Drives per Axle**
6	2	3,3
7	2	3,4
8	2	4,4
9	2	4,5
	3	3,3,3
10	2	5,5
	3	3,3,4
11	2	5,6
	3	3,4,4
12	2	6,6
	3	4,4,4
	4	3,3,3,3
13	2	6,7
	3	4,4,5
	4	3,3,3,4
14	2	7,7
	3	4,5,5
	4	3,3,4,4

RAID 50 Logical Drive		
No. of Drives	**No. of Axles**	**Drives per Axle**
15	2	7,8
	3	5,5,5
	4	3,4,4,4
	5	3,3,3,3,3
16	2	8,8
	3	5,5,6
	4	4,4,4,4
	5	3,3,3,3,4

RAID 60 – Striping of Double Parity

RAID 60 combines both RAID 6 and RAID 0 features. Data is striped across disks as in RAID 0, and it uses double distributed parity as in RAID 6. RAID 60 provides data reliability, good overall performance and supports larger volume sizes.

Figure 8. RAID 60 is a combination of RAID 6 and RAID 0



The total capacity of a RAID 60 logical drive is the smallest physical drive times the number of physical drives, minus four.

RAID 60 also provides very high reliability because data is still available even if multiple physical drives fail (two in each axle). The greater the number of axles, the greater the number of physical drives that can fail without the RAID 60 logical drive going offline.

Component	Minimum	Maximum
Number of Axles	2	16
Physical Drives per Axle	4	16
Physical Drives per Logical Drive	8	256

RAID 60 Axles

When you create a RAID 60, you must specify the number of axles. An axle refers to a single RAID 6 logical drive that is striped with other RAID 6 logical drives to make RAID 60. An axle can have from 4 to 16 physical drives, depending on the number of physical drives in the logical drive.

The chart below shows RAID 60 logical drives with 8 to 20 physical drives, the available number of axles, and the resulting distribution of physical drives on each axle.

RAID 60 Logical Drive		
No. of Drives	**No. of Axles**	**Drives per Axle**
8	2	4,4
9	2	4,5
10	2	5,5
11	2	5,6
12	2	6,6
	3	4,4,4
13	2	6,7
	3	4,4,5
14	2	7,7
	3	4,5,5
15	2	7,8
	3	5,5,5
16	2	8,8
	3	5,5,6
	4	4,4,4,4
17	2	8,9
	3	5,6,6
	4	4,4,4,5

RAID 60 Logical Drive		
No. of Drives	**No. of Axles**	**Drives per Axle**
18	2	9,9
	3	6,6,6
	4	4,4,5,5
19	2	9,10
	3	6,6,7
	4	4,5,5,5
20	2	10,10
	3	6,7,7
	4	5,5,5,5
	5	4,4,4,4,4

Choosing a RAID Level

There are several issues to consider when choosing the RAID Level for your logical drive. The following discussion summarizes some advantages, disadvantages and applications for each choice.

RAID 0

Advantages	Disadvantages
Implements a striped logical drive, the data is broken down into blocks and each block is written to a separate physical drive I/O performance is greatly improved by spreading the I/O load across many channels and drives No parity calculation overhead is involved	Not a true RAID because it is not fault-tolerant The failure of just one drive will result in all data in an logical drive being lost Should not be used in mission critical environments

Recommended applications for RAID 0:

- Image Editing
- Pre-Press Applications
- Any application requiring high bandwidth

RAID 1

Advantages	Disadvantages
Simplest RAID storage subsystem design Can increase read performance by processing data requests in parallel since the same data resides on two different drives	Very high physical drive overhead – uses only 50% of total capacity

Recommended applications for RAID 1:

- Accounting/Financial
- Payroll
- Any application requiring very high availability

RAID 1E

Advantages	Disadvantages
Implemented as a mirrored logical drive whose segments are RAID 0 logical drives High I/O rates are achieved thanks to multiple stripe segments Can use an odd number of physical drives	Very high physical drive overhead – uses only 50% of total capacity

Recommended Applications for RAID 1E

- Imaging applications
- Database servers
- General fileserver

RAID 5

Advantages	Disadvantages
High Read data transaction rate Medium Write data transaction rate Good aggregate transfer rate Most versatile RAID level	Physical drive failure has a medium impact on throughput

Recommended applications for RAID 5:

- File and Application servers
- WWW, E-mail, and News servers
- Intranet servers

RAID 6

Advantages	Disadvantages
High Read data transaction rate Medium Write data transaction rate Good aggregate transfer rate Safest RAID level	High physical drive overhead – equivalent of two drives used for parity Slightly lower performance than RAID 5

Recommended applications for RAID 6:

- Accounting/Financial
- Database servers
- Any application requiring very high availability

RAID 10

Advantages	Disadvantages
Implemented as a mirrored logical drive whose segments are RAID 0 logical drives High I/O rates are achieved thanks to multiple stripe segments	Very high physical drive overhead – uses only 50% of total capacity

Recommended applications for RAID 10:

- Imaging applications
- Database servers
- General fileserver

RAID 50

Advantages	Disadvantages
High Read data transaction rate Good write data transaction rate Very good aggregate transfer rate Most versatile RAID level	Physical drive failure has a moderate impact on throughput

Recommended applications for RAID 50:

- File and Application Servers
- Transaction Processing
- Office applications with many users accessing small files

RAID 60

Advantages	Disadvantages
High Read data transaction rate Medium Write data transaction rate Good aggregate transfer rate Safest RAID level	High disk overhead – equivalent of two drives used for parity Slightly lower performance than RAID 50

Recommended Applications for RAID 60:

- Accounting and Financial
- Database servers
- Any application requiring very high availability

Choosing Stripe Block Size

You set the stripe block size, also called block size, when you create a logical drive. With SuperTrak, the choices are 64 KB, 128 KB, 256 KB, 512 KB, and 1024 KB. 64 KB is the default.

Your choice will directly affect performance. There are two issues to consider when choosing the stripe block size.

- Choose a stripe block size equal to or smaller than the smallest cache buffer found on any physical drive in your logical drive.

  A larger value slows the logical drive down because physical drives with smaller cache buffers need more time for multiple accesses to fill their buffers.
- If your data retrieval consists of fixed-size data blocks, such as some database and video applications, choose that data block size as your stripe block size.

Generally speaking, email, POS, and webservers prefer smaller stripe block sizes. Video and database applications prefer larger stripe block sizes.

See “Creating a Logical Drive” on page 96 and “Creating a Logical Drive” on page 165, and “Creating a Disk Array – Advanced Configuration” on page 161.

Choosing Sector Size

You set the sector size when you create a logical drive. With SuperTrak, the choices are 512 B, 1 KB, 2 KB, and 4 KB. 512 B is the default.

A sector is the smallest addressable area on a physical drive. Sector Size refers to the size of sector measured by the number of bytes of data it can hold. The most common sector size is 512 bytes (512 B). A smaller sector size results in a more efficient use of a physical drive’s capacity. 512 B is the default sector size for logical drives on SuperTrak.

The number of usable sectors is limited by the addressing method of the computer's operating system:

- Windows XP (32-bit) support 10-bit logical bit addressing (LBA), so with 512 B sectors, they can only support up to 2 terabytes (TB) of data storage capacity. To increase the capacity, you must use larger sectors. See “2 TB Limitation” on page 245.
- Windows XP (64-bit), Windows Server 2003 and 2008, and Windows Vista support 64-bit LBA, so they are not affected by this limitation. For these OSes, always choose the default 512 B sector size.
- Linux operating systems with the 2.4 kernel do not support variable sector sizes. For these OSes, always choose the default 512 B sector size.

- Linux operating systems with the 2.6 kernel support 64-bit LBA. For these OSes, always choose the default 512 B sector size.

See “Creating a Logical Drive” on page 96 and “Creating a Logical Drive” on page 165, and “Creating a Disk Array – Advanced Configuration” on page 161.

2 TB Limitation

If your Host PC runs Windows XP (32-bit), and you want to create logical drives larger than 2 TB, you must choose a sector size larger than 512 B when you create the logical drive. The table on the next page correlates sector size with logical drive capacity.

Logical Drive Size	Sector Size
8 to 16 TB	4096 bytes (4 KB)
4 to 8 TB	2048 bytes (2 KB)
2 to 4 TB	1024 bytes (1 KB)
0 to 2 TB	512 bytes (512 B)

Also see “Ranges of Disk Array Expansion” on page 253.

Choosing Cache Policy

As it is used with SuperTrak, the term *cache* refers to any of several kinds of high-speed, volatile memory that hold data moving from your computer to the physical drives or vice-versa. Cache is important because it can read and write data much faster than a physical drive. There are read caches, which hold data as it is read from a physical drive; and write caches, which hold data as it is written to a physical drive.

In order to tune the cache for best performance in different applications, user-adjustable settings are provided. Cache settings are made in conjunction with logical drives:

- When you create a logical drive. See “Creating a Logical Drive” on page 96 and “Creating a Logical Drive” on page 165, and “Creating a Disk Array – Advanced Configuration” on page 161.
- On an existing logical drive. See “Changing Logical Drive Settings” on page 98 or page 174.

Read Cache Policy

- **Read Cache** – The read cache is enabled.
- **Read Ahead** – The read cache and the read-ahead feature are enabled. Read-ahead anticipates the next read and performs it before the request is made. Can increase read performance.
- **Forced Read Ahead** – Continues reading ahead even when the next read cannot be logically anticipated. Can increase read performance.
- **No Cache** – The read cache is disabled.

Write Cache Policy

- **Write Back** – Data is written first to the cache, then to the logical drive. Better performance. Requires a cache backup battery to protect data in the cache from a sudden power failure.
- **Write Through** – Data is written to the cache and the logical drive at the same time. Safer.
- **Adaptive Writeback Cache** – Data is written first to the cache, then to the logical drive. Changes the write cache settings while the cache backup battery is offline.

  When all of the following conditions occur:

  - The logical drive write policy is set to Write Back
  - The Adaptive Writeback Cache feature is enabled
  - The cache backup battery goes offline

  The write policy automatically changes to Write Through. When the battery comes back online, the write policy automatically changes back to Write Back.

Capacity Coercion

This feature is designed for fault-tolerant logical drives (RAID 1, 1E, 5, 6, 10, 50, and 60). It is generally recommended to use physical drives of the same size in your disk arrays. When this is not possible, physical drives of different sizes will work but the system must adjust for the size differences by reducing or coercing the capacity of the larger drives to match the smaller ones. With SuperTrak, you can choose to enable Capacity Coercion and any one of four methods.

Enable Capacity Coercion and choose the Method in the Controller Settings menu. See “Making Controller Settings” on page 144. The choices are:

- **GBTruncate** – (Default) Reduces the useful capacity to the nearest 1,000,000,000-byte boundary.

- **10GBTruncate** – Reduces the useful capacity to the nearest 10,000,000,000-byte boundary.
- **GRPRounding** – Uses an algorithm to determine how much to truncate. Results in the maximum amount of usable drive capacity.
- **TableRounding** – Applies a predefined table to determine how much to truncate.

Capacity Coercion also affects a replacement drive used in a disk array. Normally, when an physical drive fails, the replacement drive must be the same capacity or larger. However, the Capacity Coercion feature permits the installation of a replacement drive that is slightly smaller (within 1 gigabyte) than the remaining working drive. For example, the remaining working drives can be 80.5 GB and the replacement drive can be 80.3, since all are rounded down to 80 GB. This permits the smaller drive to be used.

Without Capacity Coercion, the controller will not permit the use of a replacement physical drive that is slightly smaller than the remaining working drive(s).

Initialization

Initialization is highly recommended for logical drives when they are created from a disk array. Initialization sets all data bits in the logical drive to zero. The action is useful because there may be residual data on the logical drives left behind from earlier configurations. You can also perform an Initialization on an existing logical drive.

Warning

When you initialize a logical drive, all the data the logical drive will be lost. Backup any important data before you initialize a logical drive.

There are three options for logical drive initialization:

- **Full** – Overwrites all data bits on the logical drive. Can take some time for larger logical drives
- **Quick** – Overwrites the data bits on the first and last blocks of logical drive. Takes only seconds.
- **None** – No initialization. Not recommended.

See “Creating a Logical Drive” on page 96 and “Creating a Logical Drive” on page 165, and “Creating a Disk Array – Advanced Configuration” on page 161, and “Initializing a Logical Drive” on page 175.

Hot Spare Drive

A hot spare is a physical drive that is available to a disk array but not actually a part of it. If you designate a spare drive, SuperTrak will replace a failed physical drive in a disk array with the hot spare drive automatically. See “Creating a Spare Drive” on page 99 or page 179.

Compared to the failed drive, the replacement drive must be:

- The same media type, HDD or SDD
- Equal or larger capacity

There are two types of hot spare drive:

- **Global** – An unassigned physical drive available to any logical drive on the Host PC.
- **Dedicated** – An unassigned physical drive that can only be used by a specified logical drive.

There is another property you can assign to a hot spare drive:

- **Revertible** – A revertible spare drive will return to spare status when the failed drive is replace with a new drive. See “Transition” on page 256.

Whenever possible, having a spare drive for your RAID system is good protection against physical drive failure. Even though the spare drive is assigned to a *disk array*, the rebuild operation is said to apply to a *logical drive*.

If you do not have a spare drive, but the **Auto Rebuild** function is enabled, the critical disk array will begin to rebuild as soon as you replace the failed physical drive with an unconfigured physical drive of equal or greater size. See “Making Background Activity Settings” on page 137.

Partition and Format the Logical Drive

Like any other type of fixed disk media in your system, a RAID logical drive must also be partitioned and formatted before use. Use the same method of partitioning and formatting on an logical drive as you would any other fixed disk.

See “Appendix A: Partition and Format” on page 285.

RAID Level Migration

To *migrate* a disk array is to do one or both:

- Change its RAID level
- Increase the number of physical drives (sometimes called *expansion*)

On SuperTrak, RAID level migration is performed on the disk array but it applies to the logical drives. Migration takes place on an existing Functional disk array without disturbing the existing data. While the disk array is migrating, you can

access the data as before. When migration is complete, your disk array will have a different RAID level and/or a larger capacity.

In most cases, you must add one or more physical drives during the migration process. You can never reduce the number of physical drives.

The tables below shows the migration options for a source logical drive according to its RAID level. The available target RAID levels are shown with their requirements.

You must use WebPAM PRO to migrate a disk array. See “Migrating a Disk Array” on page 167.

RAID 0

A RAID 0 source logical drive can migrate to the following target logical drives:

Target	Requirements
RAID 0	Add physical drives.
RAID 1	2 physical drives only. Only a single-drive RAID 0 can migrate to RAID 1 by adding 1 physical drive.
RAID 1E	3 or more physical drives.
RAID 5	3 physical drives minimum, 16 maximum. RAID 0 must have less than 16 physical drives.
RAID 6	4 physical drives minimum, 16 maximum.
RAID 10	4 physical drives minimum. Even number of physical drives.
RAID 50	6 physical drives minimum, 16 per axle maximum.
RAID 60	8 physical drives minimum, 16 per axle maximum.

RAID 1

A RAID 1 Source logical drive can migrate to the following Target logical drives:

Target	Requirements
RAID 0	None.
RAID 1E	3 or more physical drives.
RAID 5	3 physical drives minimum, 16 maximum. RAID 1 must have less than 16 physical drives.
RAID 10	4 physical drives minimum. Even number of physical drives.
RAID 50	6 physical drives minimum, 16 per axle maximum.

RAID 1E

A RAID 1E Source logical drive can migrate to the following Target logical drives:

Target	Requirements
RAID 0	None.
RAID 1E	Add physical drives.
RAID 5	3 physical drives minimum, 16 maximum. RAID 1E must have less than 16 physical drives.
RAID 10	4 physical drives minimum. Even number of physical drives.
RAID 50	6 physical drives minimum, 16 per axle maximum.

RAID 5

A RAID 5 Source logical drive can migrate to the following Target logical drives:

Target	Requirements
RAID 0	None.
RAID 1E	None.
RAID 5	Add physical drives. 16 maximum.
RAID 6	4 physical drives minimum, 16 maximum.
RAID 10	4 physical drives minimum. Even number of physical drives.
RAID 50	6 physical drives minimum, 16 per axle maximum.
RAID 60	8 physical drives minimum, 16 per axle maximum.

RAID 6

A RAID 6 Source logical drive can migrate to the following Target logical drives:

Target	Requirements
RAID 6	Add physical drives. 16 maximum.
RAID 60	8 physical drives minimum, 16 per axle maximum.

RAID 10

A RAID 10 Source logical drive can migrate to the following Target logical drives:

Target	Requirements
RAID 0	None.
RAID 1E	None.
RAID 5	3 physical drives minimum, 16 maximum. RAID 10 must have less than 16 physical drives.
RAID 6	4 physical drives minimum, 16 maximum. RAID 10 must have less than 16 physical drives.
RAID 10	Add physical drives. Even number of physical drives.
RAID 50	6 physical drives minimum, 16 per axle maximum.
RAID 60	8 physical drives minimum, 16 per axle maximum.

RAID 50

A RAID 50 Source logical drive can migrate to the following Target logical drives:

Target	Requirements
RAID 0	None.
RAID 1E	None.
RAID 5	16 physical drives maximum. RAID 50 must have less than 16 physical drives.
RAID 6	16 physical drives maximum. RAID 50 must have less than 16 physical drives.
RAID 10	Even number of physical drives.
RAID 50	Add physical drives. 16 per axle maximum.
RAID 60	8 physical drives minimum, 16 per axle maximum.

RAID 60

A RAID 60 Source logical drive can migrate to the following Target logical drives:

Target	Requirements
RAID 6	16 physical drives maximum. RAID 60 must have less than 16 physical drives.
RAID 60	Add physical drives. 16 per axle maximum.

Important

- The Target disk array may require more physical drives than the Source disk array
- If the Target disk array requires an EVEN number of physical drives but the Source disk array has an ODD number, ADD a physical drive as part of the migration process
- You cannot reduce the number of physical drives in your disk array, even if the Target disk array requires fewer physical drives than the Source disk array
- RAID 1 (mirroring) works with two drives only. Only a single-drive RAID 0 disk array can migrate to RAID 1. Other RAID Levels use too many drives to migrate
- You cannot migrate a disk array when it is Critical or performing activities such as Synchronizing, Rebuilding, and PDM
- For RAID 6 or RAID 60, you can only migrate between these two RAID levels. Destination RAID 60 axles can have up to 16 physical drives. Other limitations might apply

Ranges of Disk Array Expansion

The Windows XP (32-bit) operating systems support a 10-byte LBA format. As a result, these OSes can only recognize 4 billion addresses. If you create a logical drive using the default 512 B sector size, the logical drive will be limited to 2 TB of data, even if there is more space available on your physical drives.

This limitation does not apply to Windows XP (64-bit), 2003 Server, Vista, and Linux OSes with the 2.6 kernel. Linux OSes with the 2.4 kernel do not support variable sector sizes, therefore you cannot apply the solution described here to those OSes.

Note that once you create your logical drive, you cannot change the size of the sectors. Nor can you increase the number of address blocks that the OS recognizes.

You can direct WebPAM PRO to expand a logical drive beyond the maximum expansion size. When the expansion is finished:

- WebPAM PRO will show the logical drive in the desired size.
- Your operating system might show the logical drive at the maximum size listed in the table below.
- Additional capacity might appear as unpartitioned and unformatted.

Current LD Size	Maximum LD Expansion Size	Sector Size
8 to 16 TB	16 TB	4096 bytes
4 to 8 TB	8 TB	2048 bytes
2 to 4 TB	4 TB	1024 bytes
up to 2 TB	2 TB	512 bytes

At this point, you have the choice of:

- Format the unpartitioned/unformatted capacity as a *second* logical drive
- Delete the existing disk array and create a new one in the desired size

Delete and Recreate

If you require a logical drive larger than the maximum expansion size:

1. Backup the data from the current logical drive.
2. Delete the current logical drive.

   See “Deleting a Logical Drive” on page 98 or page 166.
3. Create a new logical drive with the desired capacity.

   See “Creating a Logical Drive” on page 96 or page 165.
4. Restore the data to the new logical drive.

Media Patrol

Media Patrol is a routine maintenance procedure that checks the magnetic media on each physical drive. Media Patrol checks all physical drives assigned to disk arrays and on spare drives. Media Patrol does not check unconfigured drives.

Unlike Synchronization and Redundancy Check, Media Patrol is concerned with the condition of the media itself, not the data recorded on the media. If Media Patrol encounters a critical error, it triggers PDM if PDM is enabled.

You can run Media Patrol:

- From the subsystem. See page 138.
- Directly on a disk array. See page 169.

Predictive Data Migration (PDM)

Predictive Data Migration (PDM) is the migration of data from the suspect physical drive to a spare drive, similar to Rebuilding a Logical Drive. But unlike Rebuilding, PDM constantly monitors your physical drives and automatically copies your data to the spare drive *before* the suspect drive fails and your Logical Drive goes Critical. See “Running PDM” on page 138 and “Running PDM on a Disk Array” on page 169.

After the data is copied from the suspect drive, the controller marks the suspect drive with a Stale configuration and a PFA error.

You can clear the Stale configuration and PFA error and put the physical drive back into service. See “Clearing Stale and PFA Conditions” on page 152 or page 269. In some cases, however, you might remove the physical drive for repair or replacement.

PDM Triggers

The following actions trigger PDM:

- A physical drive with unhealthy status (see below)
- Media Patrol finds a disk critical error*
- You initiate PDM manually

*PDM also counts the number of media errors reported by Media Patrol.

A physical drive becomes unhealthy when:

- A SMART error is reported
- The bad sector remapping table fills to the specified level

Because data would be lost if written to a bad sector, when a bad sector is detected, the physical drive creates a map around it. These maps are saved in

the bad sector remapping table, which has a capacity of 512 reassigned blocks and 1024 error blocks.

When the table fills to a specified percentage of its capacity, PDM triggers a migration of data from the suspect drive (the physical drive with the bad sectors) to a spare drive.

During data migration, you will have access to the logical drive but it will respond more slowly to read/write tasks because of the additional operation. The time required for data migration depends on the size of the physical drive.

See “Making Background Activity Settings” on page 137.

Transition

The Transition feature enables you to specify “permanent” spare drives for your SuperTrak controller. Transition is the process of replacing a revertible spare drive that is currently part of a disk array with an unconfigured physical drive or a non-revertible spare. The revertible spare drive returns to its original status.

Transition happens automatically when the following sequence of events takes place:

- You create a revertible spare drive. “Creating a Spare Drive” on page 179.
- One of the physical drives assigned to your disk array fails and the array becomes degraded and the logical drive goes critical.
- The SuperTrak controller automatically rebuilds your array to the revertible spare drive and the array becomes functional again.
- You replace the failed physical drive with a new physical drive of equal or greater capacity.
- The SuperTrak controller automatically transitions (moves) the data from the revertible spare to the new physical drive.
- The new physical drive becomes part of the array and the revertible spare drive returns to its original spare status.

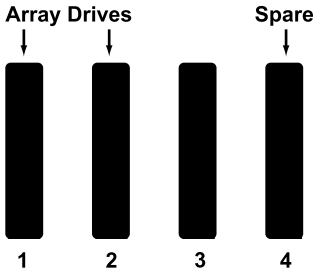
Transition happens manually when you specify a different unconfigured physical drive to transition (move) the data from the revertible spare drive.

Drive Failure and Automatic Rebuild

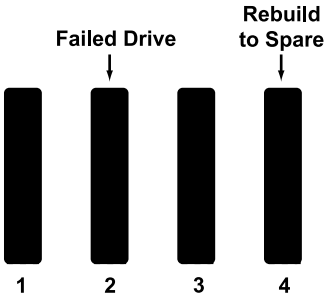
In the example below, there is a two-drive RAID 1 disk array.

- The physical drives in channels 1 and 2 belong to the disk array.
- The physical drive in channel 3 is unconfigured.

- The physical drive in channel 4 is a revertible spare drive.



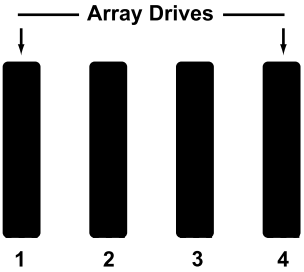
The physical drive in channel 2 fails. The disk array becomes degraded and its logical drives go critical. The SuperTrak controller automatically rebuilds the disk array using the revertible spare drive, the physical drive in channel 4.



When the rebuild is finished, the disk array and logical drives are OK again.

- The physical drives in channels 1 and 4 belong to the disk array.
- The physical drive in channel 2 has failed and is unusable.
- The physical drive in channel 3 is unconfigured.

Note that there is no spare drive at this moment.



Automatic Transition

At this juncture, you would replace the failed drive in channel 2 with a new drive of the same or greater capacity.

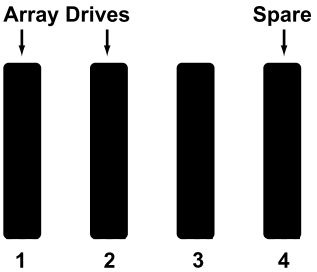
When the SuperTrak controller detects the new drive in channel 2, it will:

- Transition the data from the drive in channel 4 to the drive in channel 2.
- Return the drive in channel 4 to spare status.

When the Transition is finished:

- The physical drives in channels 1 and 2 belong to the disk array.
- The physical drive in channel 3 is still unconfigured.
- The physical drive in channel 4 is a revertible spare drive.

The original configuration is restored.

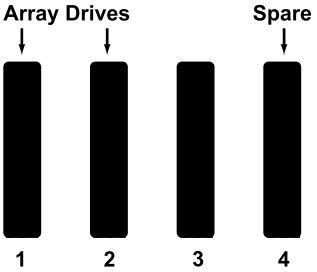


Manual Transition

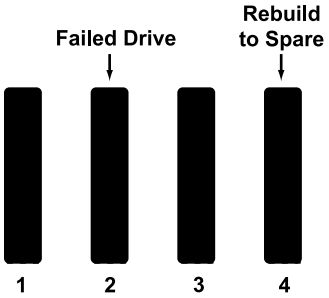
Manual transition requires an unassigned physical drive.

The example below is the same two-drive RAID 1 disk array as before.

- The physical drives in channels 1 and 2 belong to the disk array.
- The physical drive in channel 3 is unconfigured.
- The physical drive in channel 4 is a revertible spare drive.



The physical drive in channel 2 fails. The disk array becomes degraded and its logical drives go critical. The SuperTrak controller automatically rebuilds the disk array using the spare drive, the physical drive in channel 4.

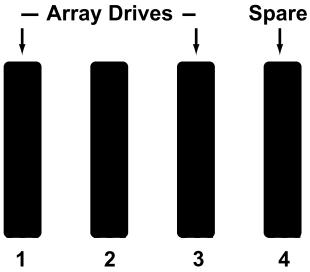


As we saw in the example of Automatic Transition, if you replace the failed physical drive in channel 2, the SuperTrak controller would transition the data from the physical drive in channel 4 to the new drive in channel 2.

But if you wanted to use a *different* physical drive in your array, such as the unassigned drive in channel 3, you would run the Transition function *manually*.

When the Manual Transition is finished:

- The physical drives in channels 1 and 3 belong to the disk array.
- The physical drive channel 2 is still failed and unusable.
- The physical drive in channel 4 is a revertible spare drive.



At this point, after running the Manual Transition, you would replace the failed drive in channel 2. The replacement drive in channel 2 will remain unconfigured until you assign it to a disk array or as a spare.

Chapter 8: Troubleshooting

- Problem Reports from SuperTrak
  - Buzzer (page 261)
  - LEDs (page 261)
  - BIOS (page 263)
- Problems Reported in WebPAM PRO (page 265)
- Critical & Offline Logical Drives (page 267)
- Salvaging Physical Drives (page 269)
- Rebuilding a Disk Array Automatically (page 270)
- Rebuilding a Disk Array Manually (page 270)
  - Rebuilding with WebPAM PRO (page 270)
  - Rebuilding with SuperBuild (page 271)
- Recovering from a Blank Screen (page 272)
- Cache Battery Does Not Charge (page 272)

Problems Reported by SuperTrak

The SuperTrak EX Controller provides both audible and visual indicators to alert you to a problem.

Buzzer

The buzzer sounds to inform you that your RAID system needs attention. But the buzzer does not specify the condition. When a continuous tone sounds, there are multiple alarm patterns sounding at the same time.

When the buzzer sounds, take the following actions:

- Check your disk arrays and logical drives.
- Check the Event Log. See page 103 or page 115.

LEDs

If your system is configured with Global LEDs or Direct LEDs, they will indicate when a problem is present. Use the SuperBuild utility or WebPAM PRO to further diagnose and correct the problem.

Global LED Display

Global LEDs glow in response to Logical Drive status.

LED	Logical Drive Status
Dark	System off
Green	Normal
Amber	Logical Drive Critical
Red	Logical Drive Offline

Direct LED Display

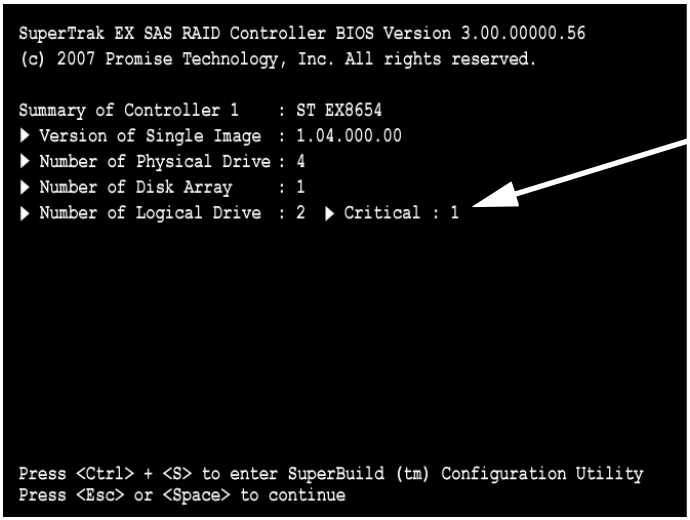
Direct LEDs, glow and blink in response to the SuperTrak's firmware status.

Fault LED	Activity LED	Firmware Status
OFF	OFF	No physical drive
ON	ON	Unconfigured physical drive
OFF	ON	Configured physical drive – Status OK
ON	ON	Configured physical drive – Status Not OK
OFF	ON	Global spare drive – Status OK
ON	ON	Physical drive – Status Dead
ON	ON	Stale condition
Blink	ON	Rebuilding
OFF	Blink	Activity
Blink	ON	Locate physical drive
Blink	ON	Locate logical drive
Blink	ON	Locate disk array

BIOS

The problem is first reported in the SuperTrak BIOS screen when you boot your PC or server, as shown below.

Figure 1. SuperTrak BIOS screen, logical drive critical

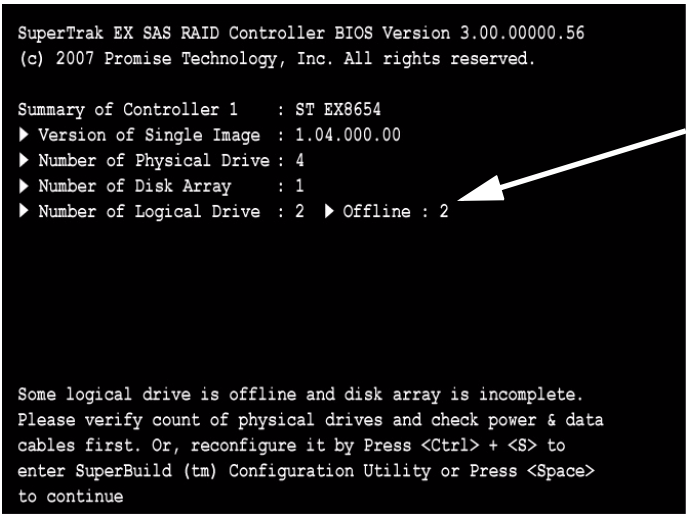

SuperTrak EX SAS RAID Controller BIOS Version 3.00.00000.56
(c) 2007 Promise Technology, Inc. All rights reserved.
Summary of Controller 1 : ST EX8654
Version of Single Image : 1.04.000.00
Number of Physical Drive : 4
Number of Disk Array : 1
Number of Logical Drive : 2
Critical : 1
Press <Ctrl> + <S> to enter SuperBuild (tm) Configuration Utility
Press <Esc> or <Space> to continue

If the SuperTrak BIOS detects an *Critical* logical drive, the BIOS reports the condition but allows the booting process of the Host PC to continue.

Choose a Management application:

- Press Ctrl-S at the BIOS screen to open the SuperBuild utility.
- Allow your OS to boot, then open WebPAM PRO.

Figure 2. SuperTrak BIOS screen, logical drive offline


SuperTrak EX SAS RAID Controller BIOS Version 3.00.00000.56
(c) 2007 Promise Technology, Inc. All rights reserved.
Summary of Controller 1 : ST EX8654
Version of Single Image : 1.04.000.00
Number of Physical Drive : 4
Number of Disk Array : 1
Number of Logical Drive : 2 Offline : 2
Some logical drive is offline and disk array is incomplete.
Please verify count of physical drives and check power & data
cables first. Or, reconfigure it by Press <Ctrl> + <S> to
enter SuperBuild (tm) Configuration Utility or Press <Space>
to continue

If the SuperTrak BIOS detects an *Offline* logical drive, the BIOS reports the condition and temporarily halts the booting process of the Host PC.

Choose a Management application:

- Press Ctrl-S to open the SuperBuild utility.
- Press the Space bar, allow your OS to boot, then open WebPAM PRO.

Problems Reported in WebPAM PRO

Opening WebPAM PRO

If WebPAM PRO is not running, do the following actions:

1. Open WebPAM PRO.

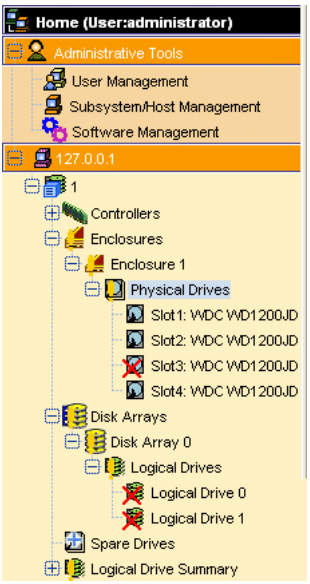
   See “Logging into WebPAM PRO” on page 109 for more information.

2. Click the Subsystem icon in Tree View.
3. Click the Enclosures icon and its subordinate icons.
4. Click the Disk Arrays icon and its subordinate icons.

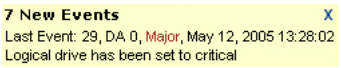
What to Look For

When a logical drive goes critical or offline, WebPAM PRO reports the condition in the following ways:

- Displays yellow !s red Xs in Tree View (below)



- Sends email messages, per your configuration
- Displays popup messages, per your configuration (below)



- Keeps a record in the Event Log (below)

Thu, May 12, 2005 13:30:50 Max Events Display 10

#	Device	Event ID	Severity	Time	Description
34	DA 0	0x000F0001	Info	May 12, 2005 13:28:47	Rebuild is completed
33	LD 0	0x00090006	Info	May 12, 2005 13:28:47	Rebuild marks the logical drive synchronized upon rebuild completion
32	LD 0	0x00090002	Info	May 12, 2005 13:28:47	Logical drive has been placed online
31	DA 0	0x000F0000	Info	May 12, 2005 13:28:03	Rebuild is started
30	PD 5	0x000D000B	Info	May 12, 2005 13:28:02	Physical Disk has been removed
29	LD 0	0x00090004	Major	May 12, 2005 13:28:02	Logical drive has been set to critical
28	PD 5	0x000D001A	Major	May 12, 2005 13:28:02	Physical Disk is marked as DEAD due to removal
27	Spare 0	0x001D0001	Info	May 12, 2005 02:00:26	Spare check completed successfully on the given spare drive
26	Spare 1	0x001D0001	Info	May 12, 2005 02:00:26	Spare check completed successfully on the given spare drive
25	Spare 0	0x001D0000	Info	May 12, 2005 02:00:26	Spare check started on the given spare drive

Critical & Offline Logical Drives

A fault-tolerant logical drive—RAID 1, 1E, 5, 6, 10, 50, or 60—goes *critical* when a physical drive is removed or fails. Due to the fault tolerance of the logical drive, the data is still available and online. However, once the logical drive goes critical, the logical drive has lost its fault tolerance, and performance may be adversely affected.

If the fault was caused by a failed physical drive, the failed drive must be replaced in order for the disk array to rebuild and restore the logical drives on the array to normal or OK status.

If your fault-tolerant logical drive—RAID 1, 1E, 5, 6, 10, 50, or 60—goes *offline*, contact Technical Support. See page 277.

Warning

Take no further corrective action until you have consulted with Technical Support. See page 277.

A non-fault tolerant logical drive—RAID 0—goes *offline* when a physical drive is removed or fails. Since the logical drive is not fault tolerant, the data stored in the logical drive is no longer accessible.

If one physical drive fails, all of the data on the RAID 0 logical drive is lost. You must replace the failed drive. Then, if the logical drive had more than one physical drive, delete the logical drive and re-create it. Restore the data from a backup source.

Finding the Failed Drive in SuperBuild

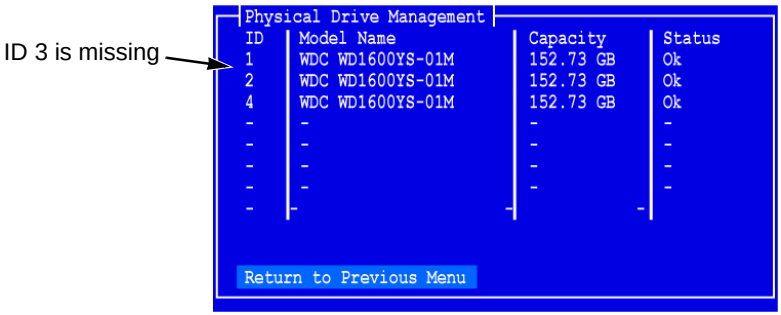
To identify a failed physical drive:

1. In the Main Menu, highlight *Physical Drive Management* and press Enter.

   The Physical Drive Management screen displays.

2. Compare the list of physical drives on the screen against the actual physical drives attached to the SuperTrak controller.

Figure 3. Physical Drive Management screen

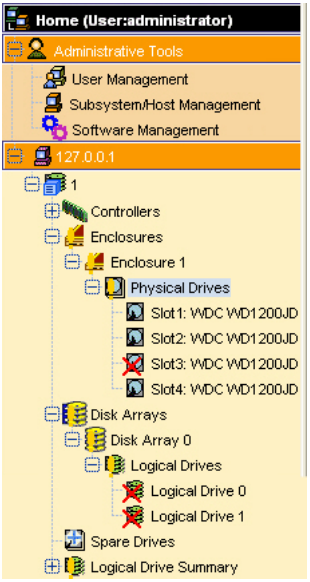


In the example above, there is no physical drive for ID 3. Assuming you installed a physical drive onto Channel 3 of the SuperTrak controller, this is the failed physical drive.

3. Shut down the Host PC, open the case, check the power and data connections to each physical drive, correct any shortcomings, restart the Host PC and check in SuperBuild again.

Finding the Failed Drive in WebPAM PRO

To locate a failed or missing physical drive:



1. Open WebPAM PRO.

   See “Logging into WebPAM PRO” on page 109 for more information.

2. Click the Subsystem icon in Tree View.
3. Click the Enclosures icon.
4. Click the Enclosure icon.
5. Click the Physical Drives icon.
6. Examine the list of physical drives.
   - If a drive was present but is now missing, that is the failed drive. Check the power and data connections. If those are OK, you must replace the drive.
   - If a drive is marked as PFA or Stale, that is the problem drive and you might be able to salvage the drive.
   - If a drive is marked as Offline or Dead, that is the problem drive and you must replace it.

Salvaging Physical Drives

Physical drives can develop problems that make them unsuitable for service in a logical drive. These problems are reflected in the physical drive status:

- **PFA** – The physical drive has errors resulting in a prediction of failure
- **Stale** – Caused by obsolete array information on the physical drive
- **Offline** – The physical drive is present but set to Offline status
- **Dead** – Physical drive set down by the SuperTrak controller

WebPAM PRO has features to deal with PFA or Stale physical drives. An Offline or Dead physical drive cannot be salvaged and must be replaced.

Clearing Stale and PFA Conditions

To clear a Stale or PFA status from a physical drive:

1. Open WebPAM PRO.
   See “Logging into WebPAM PRO” on page 109 for more information.
2. Click the Subsystem icon in Tree View.
3. Click the Enclosures icon.
4. Click the Enclosure icon.
5. Click the Physical Drives icon.
6. Click a Physical Drive icon.
7. In Management View, click the **Clear** tab.
8. Click the **Submit** button.

Note

If a physical drive has both a Stale and a PFA condition, click the **Submit** button once to clear the Stale condition, then click again to clear the PFA condition.

Rebuilding a Disk Array Automatically

When you rebuild a disk array, you are actually rebuilding the data onto a replacement physical drive.

Normally, a Critical disk array automatically rebuilds itself using a designated spare drive. See “Creating a Spare Drive” on page 99 or page 179.

If you do not have a spare drive, the Critical disk array automatically rebuilds itself as soon as you remove the failed drive and insert a replacement drive. Note the replacement drive requirements, below.

During the rebuild:

- The alarm sounds two short beeps, repeated
- No warning icon displays over the disk array or logical drive icons

  The disk array’s Operational Status as *OK, Rebuilding*.

  You can still read and write data to the logical drive. However, fault tolerance is lost until the disk array completes the rebuild.

After a successful rebuild:

- The alarm is silent
- The logical drive’s Operational Status is OK
- The rebuilt physical drive Status LED displays steady green

Rebuilding a Disk Array Manually

Important

The replacement physical drive must be:

- The same media type, HDD or SDD, as the other drives in the array.
- Equal or larger capacity than the failed drive it replaces.
- Free of any previous configuration data. See page 269.

If the Auto Rebuild function is disabled and no spare drives are available, you must initiate the procedure.

First, identify and replace the failed physical drive. See page 267 or page 268.

Then rebuild the disk array as described below.

Rebuilding with WebPAM PRO

To manually rebuild a disk array in WebPAM PRO:

1. Click the Subsystem icon in Tree View.

2. Click the Disk Arrays icon.
3. Click the Disk Array icon.

   If there are multiple disk arrays, choose the icon with the yellow !.
4. From the dropdown menu on the **Background Activities** tab, choose *Start Rebuild*.
5. Choose Source physical drive.

   The Source is a remaining functional physical drive in the disk array.
6. Choose the Target physical drive.

   The Target is the replacement physical drive.
7. Click the **Submit** button.

The Disk Array Background Activity tab shows rebuild progress on the replacement (target) physical drive. Depending the size of the physical disk involved, this process will take some time.

To view more information, click the **Rebuild on PDx** link.

Rebuilding with SuperBuild

To manually rebuild a disk array in the SuperBuild Utility:

1. In the Main Menu, highlight *Disk Array Management* and press Enter.

   The Disk Array Management screen displays.
2. Highlight the Disk Array with the failed drive and press Enter.

   The Disk Array Info and Setting screen displays.
3. Highlight Physical Drives in the Array and press Enter.

   Note the ID numbers of the physical drives that are still functional.
4. Highlight *Start Manual Rebuild* and press Enter.

   The Manual Rebuild screen displays.
5. Highlight the *Source Sequence Number* and press Enter.

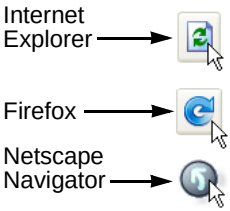
   Then type the ID number of one of the physical drives you noted in step 3 and press Enter.
6. Highlight the *Target Physical Drive ID* and press Enter.

   Then type the ID number of the new drive and press Enter.
7. Highlight *Start Manual Rebuild* and press Enter.

   The time required for the Rebuild depends on the number and size of your logical drives. You can monitor the progress of the Rebuild under Background Activity.

Recovering from a Blank Screen

Occasionally, while you are performing a RAID management operation using WebPAM PRO, your browser screen might go blank.



To recover from a blank browser screen, do one of the following actions:

- Press the F5 key.
- Click your browser's **Refresh** button (right).

Cache Battery Does Not Charge

The RAID controller's cache backup battery protects data in the cache for up to 72 hours in the event of a power failure. If the battery is too warm, it will not accept a charge nor will it discharge to power the cache.

To view battery information:

1. Click the Subsystem icon in Tree View.
2. Click the Controllers icon.
3. Click the Controller icon.
4. Click the **Battery** tab in Management View.

In normal operation, the operational status of the battery shows Fully Charged with a Reserve Capacity of 100%. If it never reaches this condition or remains discharged, the battery may be too warm.

RAID controllers, like all components inside the Host PC, rely on a flow of air to carry off heat and maintain optimal temperature. If the air flow is inadequate, performance can suffer.

Check and correct the following conditions:

- Ambient operating temperature must not exceed 104°F (40°C).
- Be sure the fan outlets, typically at the back of the PC or server, have at least 6 inches (15 cm) of clearance.
- If you have other PCI devices and available slots, try moving the SuperTrak and the other devices further apart to increase airflow between them.
- Airflow through your PC or server must be at least 200 LFM.

Measuring and adjusting airflow through a PC or server is very difficult for users in the field. Contact the manufacturer's Technical Support for assistance.

Chapter 9: Support

- Frequently Asked Questions (below)
- Contacting Technical Support (page 277)
- Limited Warranty (page 280)
- Returning the Product For Repair (page 282)

Frequently Asked Questions

This section lists frequently asked questions involving pre-installation, drive issues, installation, and post-installation.

Pre-Installation (Speed, Device Types, Capacity, Cabling)

What kind of HDDs can I use for a SuperTrak EX Series logical drive?

You can use any Serial Attached SCSI (SAS) or Serial ATA (SATA) hard disk drive from the *compatibility list* on the Promise Support Website. Use matching drives for multiple-drive arrays to maximize capacity usage as well as performance.

What is the maximum physical drive storage capacity of SuperTrak EX Series?

The SuperTrak EX4650 supports up to 3.0 TB (four 750 GB physical drives).

The SuperTrak EX8650, EX8654, and EX8658 support up to 6.0 TB (eight 750 GB physical drives).

The SuperTrak EX16650 supports up to 16.0 TB (sixteen 1.0 TB physical drives).

The SuperTrak EX Series controllers also support up to 128 SAS physical drives per SAS port using SAS expanders.

Can I use ATAPI devices on the SuperTrak EX Series?

No. The SuperTrak EX Series Controller does not support ATAPI devices.

Will ACPI work with HDDs on the SuperTrak EX Series?

Yes. The SuperTrak EX Series controller supports ACPI S1, S3 and S4 standby modes.

What kind of PCI slots do the SuperTrak EX Series controllers use?

SuperTrak EX Series controllers will work in a PCI-Express x8 slot or x16 slot.

How can I change the resources that the SuperTrak uses?

The SuperTrak EX Series Controllers are fully PnP. This means all the resources that it uses are given to it by the PnP BIOS on the motherboard.

The SuperTrak Series Controller supports IRQ sharing, but this feature only works when ALL the concerned devices support it. If your motherboard allows you to control the assignment of these resources, you may be able to remedy the problem by:

- Changing the IRQ assignments to the PCI slots in the motherboard BIOS during boot up.
- Reset the configuration data in your CMOS. This is usually an option in the PnP section of your CMOS.
- Otherwise, switch the SuperTrak Controller card to a different PCI slot.

Drive Issues

Can I add a drive to a SuperTrak EX Series logical drive via hot-swap and dynamically adjust the array size/configuration?

Yes. The SuperTrak EX Series controller supports online logical drive expansion and migration. You must use the SuperBuild utility or the WebPAM PRO software to expand or migrate an existing logical drive.

Do the HDDs on the SuperTrak EX Series have to be the same size?

The physical drives that you use with the SuperTrak EX Series controller do not have to be the same size. If the sizes differ, the SuperTrak EX Controller will truncate the large drive so the capacities match. The resulting difference in drive space is unusable, so avoid using physical drives of significantly different capacities.

Can I take a drive used in a SuperTrak EX Series logical drive and access it directly with a different controller, such as the one integrated on the motherboard?

Yes, but only under certain configurations. First, the other controller must address the drives as LBA, not CHS.

Second, only the following configurations allow the drive(s) to be accessed individually on another controller:

- Single-drive RAID 0 (stripe)
- One drive from a RAID 1 (mirror) logical drive

No other array configurations will work for this purpose.

I already have an array on a Promise FastTrak controller. Can I move that array to my new SuperTrak EX Series controller?

No. The SuperTrak EX Series controller supports SNIA Disk Data Format (DDF), which is not backward compatible with the FastTrak controller.

If I have a problem with one of the drives on the SuperTrak EX Series, how can I low-level format it to correct the problem?

Do NOT do this! Low-level formatting hard physical drives is not only unnecessary but it generally does not correct problems commonly experienced during use.

Errors such as bad sectors or ECC/CRC failure are best remedied by completely replacing the drive. For this reason, do NOT low-level format the drives attached to the SuperTrak EX Series controller.

Do I have to install disk management software on my logical drive in order to access the full storage capacity of drives?

No! Disk management software will only complicate things. The logical drive should be fully addressable by your OS as it is. Some operating systems have limits on the sizes of partitions and logical drives that can be defined. Consult your OS documentation about partitioning larger drives.

What system BIOS setup settings do I use for the drives on the SuperTrak EX Series?

A BIOS setting is required only if you want to boot your system from the logical drive on the SuperTrak EX Series controller. After your logical drive is created, partitioned and formatted, make the change in your BIOS boot order setting.

How do I partition/format my SuperTrak EX Series RAID logical drive?

The SuperTrak EX Series controller represents the logical drive as a single physical drive to your system. Therefore, anything that you can do to a single physical drive you can do to a SuperTrak logical drive.

For example, you should use the FDISK and FORMAT utilities to partition and format the logical drive. You can format the logical drive with any file system you wish.

Installation Issues (Capacity, Booting)

How can I change the system boot sequence in order to boot from the SuperTrak EX Series logical drive?

The boot sequence is controlled by the system BIOS. As far as the system BIOS is concerned, the SuperTrak EX Controller and defined logical drives

are categorized as a SCSI device. This allows you to set the boot sequence in your BIOS setup utility to boot from SCSI first, rather than IDE.

If there are multiple SCSI add-in controllers in the system, then the boot sequence among them will be determined exclusively by their PCI slot priority. PCI slot #1 will be first, slot #2 second, etc. Put the SuperTrak EX Controller in the PCI-Express slot where it will be accessed ahead of other SCSI controllers if you want to boot from the logical drive.

How can I change the boot sequence between a PCI SCSI card and the SuperTrak EX Series RAID logical drive?

Since all PCI-Express are PnP, it is difficult to determine which device is addressed first. Most motherboard BIOSes have advanced options that identify devices and allow you to choose which device will be assigned resources first. Otherwise you may have to physically switch the device cards on the PCI/PCI-Express/PCI-X slots so that the boot device is in the highest priority slot number (see previous question).

Post-Installation

Why can't I see the drives on the SuperTrak EX Series under FDISK?

You have not created a logical drive yet. Without a logical drive, the system will not recognize the physical drives attached to the SuperTrak EX Controller.

A physical drive is recognized by the SuperTrak controller but not available to use in a disk array. How can I make it available?

The physical drive might contain obsolete disk array information. See "Clearing Stale and PFA Conditions" on page 152 or page 269. This action clears the obsolete information in order to make the drive available.

Why can't I run WebPAM PRO in Konqueror?

The Konqueror browser (Linux) does not support WebPAM PRO. Install a Netscape Navigator or Firefox browser. With that browser as the default, reinstall WebPAM PRO.

Aren't the WebPAM PRO icons supposed to be animated?

Yes, they are animated. However, the default setting for Internet Explorer under Windows 2003 Server does not display animation in the browser. Go to Internet Options > Advanced and check *Play animations in web pages*.

Contacting Technical Support

Promise Technical Support provides several support options for Promise users to access information and updates. We encourage you to use one of our electronic services, which provide product information updates for the most efficient service and support.

If you decide to contact us, please have the following information available:

- Product model and serial number
- BIOS and driver version numbers
- A description of the problem / situation
- System configuration information, including: motherboard and CPU type, hard drive model(s), SAS/SATA/ATA/ATAPI drives & devices, and other controllers.

Technical Support Services

Promise Online™ Web Site	http://www.promise.com/support/support_eng.asp. (technical documents, drivers, utilities, etc.)

United States

E-mail Support	e-Support On-Line
Fax Support	+1 408 228 1100 Attn: Technical Support
Phone Support	+1 408 228 1400 option 4
If you wish to write us for support:	Promise Technology, Inc. 580 Cottonwood Drive Milpitas, CA 95035, USA

The Netherlands

E-mail Support	e-Support On-Line
Fax Support	+31 0 40 256 9463 Attn: Technical Support
Phone Support	+31 0 40 235 2600
If you wish to write us for support:	Promise Technology Europe B.V. Science Park Eindhoven 5542 5692 EL Son, The Netherlands

Germany

E-mail Support	e-Support On-Line
Fax Technical Support	+49 0 2 31 56 76 48 29 Attn: Technical Support
Phone Technical Support	+49 0 2 31 56 76 48 10
If you wish to write us for support:	Promise Technology Germany Europaplatz 9 44269 Dortmund, Germany

Italy

E-mail Support	e-Support On-Line
Fax Support	+39 0 6 367 124 00 Attn: Technical Support
Phone Support	+39 0 6 367 126 26
If you wish to write us for support:	Promise Technology Italy Piazza del Popolo 18 00187 Roma, Italia

Taiwan

E-mail Support	e-Support On-Line
Fax Support	+886 3 578 2390 Attn: Technical Support
Phone Support	+886 3 578 2395 ext. 8822 or 8823
If you wish to write us for support:	Promise Technology, Inc. 2F, No. 30, Industry E. Rd. IX Science-based Industrial Park Hsin-Chu 30075, Taiwan (R.O.C.)

China

E-mail Support	e-Support On-Line
Fax Support	+86 10 8857 8015 Attn: Technical Support
Phone Support	+86 10 8857 8085 or 8095
If you wish to write us for support:	Promise Technology China – Beijing Room 1205, Tower C Webok Time Center, No.17 South Zhong Guan Cun Street Hai Dian District, Beijing 100081, China
E-mail Support	e-Support On-Line
Fax Support	+86 21 6249 4627 Attn: Technical Support
Phone Support	+86 21 6249 4192, 4193, or 4199
If you wish to write us for support:	Promise Technology China – Shanghai Room 508, Leader Tower 1189 West Wu Ding Road Jing An District, Shanghai 200042, China

Limited Warranty

Promise Technology, Inc. (“Promise”) warrants that this product, from the time of the delivery of the product to the original end user:

a) all components, except the cache backup battery, for a period of three (3) years;

b) the cache backup battery, for a period of one (1) year;

c) will conform to Promise’s specifications;

d) will be free from defects in material and workmanship under normal use and service.

This warranty:

a) applies only to products which are new and in cartons on the date of purchase;

b) is not transferable;

c) is valid only when accompanied by a copy of the original purchase invoice.

d) Is not valid on spare parts.

This warranty shall not apply to defects resulting from:

a) improper or inadequate maintenance, or unauthorized modification(s), performed by the end user;

b) operation outside the environmental specifications for the product;

c) accident, misuse, negligence, misapplication, abuse, natural or personal disaster, or maintenance by anyone other than a Promise or a Promise-authorized service center.

Disclaimer of other warranties

This warranty covers only parts and labor, and excludes coverage on software items as expressly set above.

Except as expressly set forth above, Promise DISCLAIMS any warranties, expressed or implied, by statute or otherwise, regarding the product, including, without limitation, any warranties for fitness for any purpose, quality, merchantability, non-infringement, or otherwise. Promise makes no warranty or representation concerning the suitability of any product for use with any other item. You assume full responsibility for selecting products and for ensuring that the products selected are compatible and appropriate for use with other goods with which they will be used.

Promise DOES NOT WARRANT that any product is free from errors or that it will interface without problems with your computer system. It is your responsibility to back up or otherwise save important data before installing any product and continue to back up your important data regularly.

No other document, statement or representation may be relied on to vary the terms of this limited warranty.

Promise's sole responsibility with respect to any product is to do one of the following:

a) replace the product with a conforming unit of the same or superior product;

b) repair the product.

Promise shall not be liable for the cost of procuring substitute goods, services, lost profits, unrealized savings, equipment damage, costs of recovering, reprogramming, or reproducing of programs or data stored in or used with the products, or for any other general, special, consequential, indirect, incidental, or punitive damages, whether in contract, tort, or otherwise, notwithstanding the failure of the essential purpose of the foregoing remedy and regardless of whether Promise has been advised of the possibility of such damages. Promise is not an insurer. If you desire insurance against such damage, you must obtain insurance from another party.

Some states do not allow the exclusion or limitation of incidental or consequential damages for consumer products, so the above limitation may not apply to you.

This warranty gives specific legal rights, and you may also have other rights that vary from state to state. This limited warranty is governed by the State of California.

Your Responsibilities

You are responsible for determining whether the product is appropriate for your use and will interface with your equipment without malfunction or damage. You are also responsible for backing up your data before installing any product and for regularly backing up your data after installing the product. Promise is not liable for any damage to equipment or data loss resulting from the use of any product.

Returning the Product For Repair

If you suspect a product is not working properly, or if you have any questions about your product, contact our Technical Support Staff through one of our Technical Services, making sure to provide the following information:

- Product model and serial number (required)
- Return shipping address
- Daytime phone number
- Description of the problem
- Copy of the original purchase invoice

The technician will assist you in determining whether the product requires repair. If the product needs repair, the Technical Support Department will issue an RMA (Return Merchandise Authorization) number.

Important

Obtain an RMA number from Technical Support *before* you return the product and write the RMA number on the label. The RMA number is essential for tracking your product and providing the proper service.

Return ONLY the specific product covered by the warranty (do not ship cables, manuals, diskettes, etc.), with a copy of your proof of purchase to:

USA and Canada:	Promise Technology, Inc. Customer Service Dept. Attn.: RMA # _____ 47654 Kato Road Fremont, CA 94538
Other Countries:	Return the product to your dealer or retailer. Contact them for instructions before shipping the product.

You must follow the packaging guidelines for returning products:

- Use the original shipping carton and packaging
- Include a summary of the product's problem(s)
- Write an attention line on the box with the RMA number
- Include a copy of proof of purchase

You are responsible for the cost of insurance and shipment of the product to Promise. Note that damage incurred due to improper transport or packaging is not covered under the Limited Warranty.

When repairing returned product(s), Promise may replace defective parts with new or reconditioned parts, or replace the entire unit with a new or reconditioned unit. In the event of a replacement, the replacement unit will be under warranty for the remainder of the original warranty term from purchase date, or 30 days, whichever is longer.

Promise will pay for standard return shipping charges only. You will be required to pay for any additional shipping options (such as express shipping).

Appendix A: Partition and Format

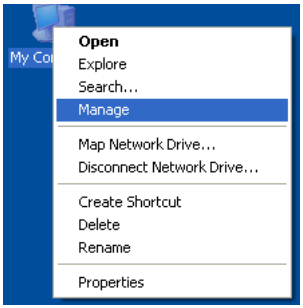
In order for your operating system to recognize and work with the physical drives attached to your SuperTrak EX Controller card, the drives must be partitioned and formatted.

- If your drives were previously partitioned and formatted they are ready to use and you can skip this procedure
- If your drives have not been partitioned and formatted, you must do that job before you can use them

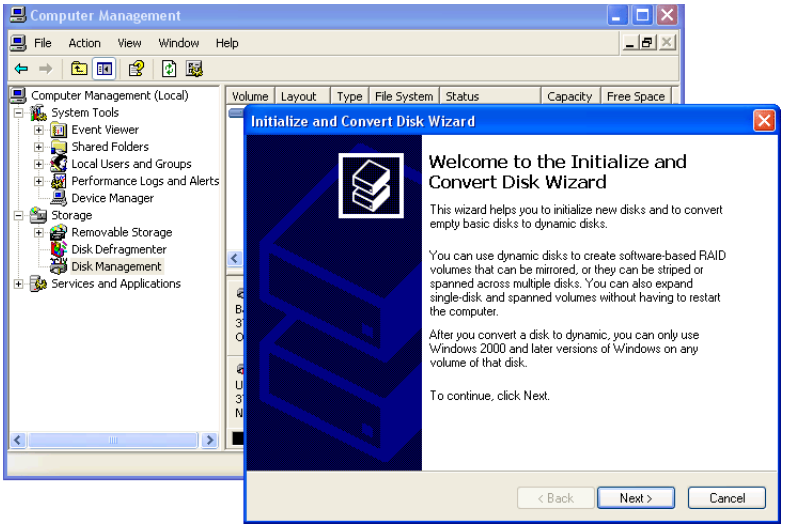
The actions of partitioning and formatting create a file structure on the physical drives with which your operating system can work. In the example below, we show how this is done in Windows. A similar procedure is required for Linux PCs. However, partitioning and formatting in Linux is not automated, therefore please refer to your system documentation for the exact procedure.

Note

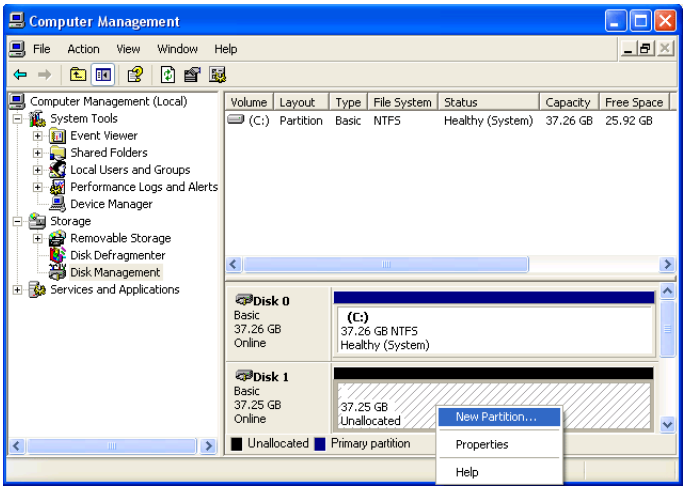
If you plan to boot your computer from this logical drive, you will perform partitioning and formatting during the OS installation. The instructions here are for data logical drives only.



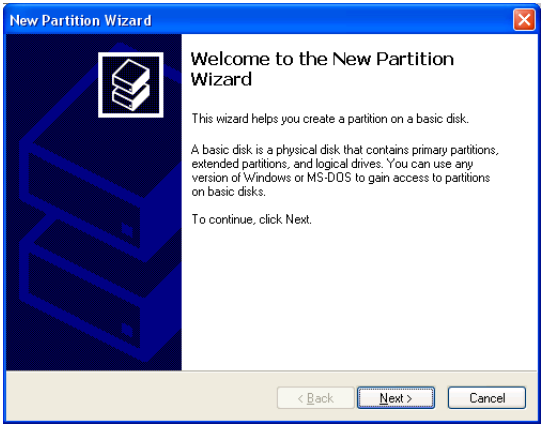
1. From the desktop, right-click the **My Computer** icon and choose *Manage* from the popup menu. The Computer Management window opens.
2. From the left menu, click **Disk Management**. The Disk Management window opens with your new logical disk identified as Disk 1. The Initialize Wizard appears automatically.


Computer Management
File Action View Window Help
Computer Management (Local)
System Tools
Event Viewer
Shared Folders
Local Users and Groups
Performance Logs and Alerts
Device Manager
Storage
Removable Storage
Disk Defragmenter
Disk Management
Services and Applications
Volume Layout Type File System Status Capacity Free Space
Initialize and Convert Disk Wizard
Welcome to the Initialize and Convert Disk Wizard
This wizard helps you to initialize new disks and to convert empty basic disks to dynamic disks.
You can use dynamic disks to create software-based RAID volumes that can be mirrored, or they can be striped or spanned across multiple disks. You can also expand single-disk and spanned volumes without having to restart the computer.
After you convert a disk to dynamic, you can only use Windows 2000 and later versions of Windows on any volume of that disk.
To continue, click Next.
< Back
Next >
Cancel

3. Click the **Next** button to start the Wizard.
4. In the following windows, choose Disk 1 to Initialize. Do not choose any disks to Convert. Click the **Finish** button to Initialize the logical disk.

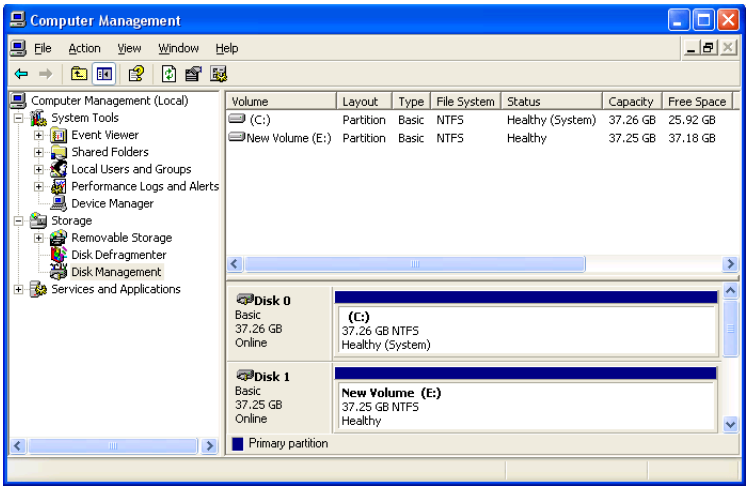


5. Right-click the **Unallocated** portion of Disk 1 and choose *New Partition...* from the popup menu. The New Partition Wizard appears.

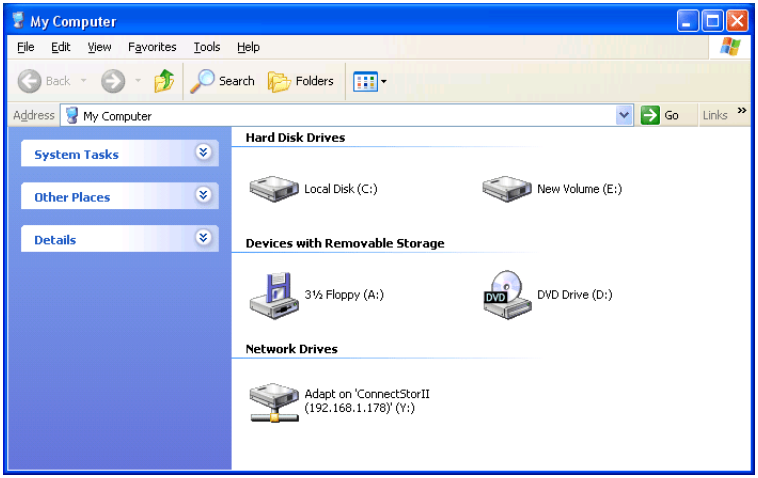

New Partition Wizard
Welcome to the New Partition Wizard
This wizard helps you create a partition on a basic disk.
A basic disk is a physical disk that contains primary partitions, extended partitions, and logical drives. You can use any version of Windows or MS-DOS to gain access to partitions on basic disks.
To continue, click Next.
< Back
Next >
Cancel

6. Click the **Next** button to start the wizard.
7. In the following windows, do the following actions. Click **Next** to move to the next window.
   - Choose Primary Partition
   - Specify the maximum available partition size in MB
   - Assign the available drive letter of your choice
   - Choose Format this partition with the following settings
   - File system: NTFS
   - Allocation unit size: Default
   - Volume label: Enter your choice of name
   - Do not check “Perform a quick format” or “Enable file and folder compression”
8. Review your selections and click **Finish**. The New Partition Wizard will disappear while partitioning and formatting begin.

   This process will take some time. The Disk Management window displays the progress.



When formatting is complete, your logical disk will appear as a hard drive in the Disk Management window (above) and the My Computer window (below).



Appendix B: Upgrades

- Updating SuperTrak BIOS and Firmware (page 289)
- Updating WebPAM PRO (page 290)

Updating SuperTrak BIOS and Firmware

Follow this procedure to upgrade the BIOS and Firmware on your SuperTrak EX4650, EX8650, EX8654, EX8658, or EX16650 Controller card.

The SuperTrak card must be properly installed in your PC or server in order to perform the update. See “Installing the SuperTrak Card” on page 9 for more information.

Downloading BIOS and Firmware File

1. Go to the Promise Support Website at http://support.promise.com/.
2. Click *Downloads*.
3. Click the Select Product popup menu and choose *SuperTrak EX4350/EX8650/EX8654/EX8658/EX16650*.
4. Click the Select Category popup menu and choose *All*.
5. Click the **GO** button.

   The list of available downloads displays. The firmware and BIOS come together in a single package.
6. Click the package you want. Be sure you choose the latest version.
7. In the File Download dialog box, click the **Save** button.
8. In the Save As dialog box, direct the file to save to a convenient location on your PC.
9. Continue the update procedure in WebPAM PRO. See “Updating the Firmware” on page 132.

Important

- After you update your BIOS and Firmware, install the latest SuperTrak driver for your OS. See “Chapter 3: Installing Drivers” on page 63.
- If you also plan to update the firmware on a VTrak RAID subsystem or JBOD enclosure, download the firmware packages for those products separately.

Updating WebPAM PRO

Follow this procedure to upgrade the WebPAM PRO Software on your PC or server.

Downloading the WebPAM PRO Update File

1. Go to the Promise website http://support.promise.com/.
2. Click *Downloads*.
3. Click the Select Product popup menu and choose *SuperTrak EX4350/EX8650/EX8654/EX8658/EX16650*.
4. Click the Select Category popup menu and choose *Utility*.
5. Click the **GO** button.

   The list of the current WebPAM PRO software displays. Promise provides versions of WebPAM PRO software for Windows and Linux. Be sure you choose the latest version.
6. Click the WebPAM PRO file you want.
7. In the File Download dialog box, click the **Save** button.
8. In the Save As dialog box, direct the software to save to a convenient location on your PC.
9. Unzip the downloaded WebPAM package.

   The result is a single installer file.

Installing the WebPAM PRO Update File

You must manually uninstall the existing version of WebPAM PRO before installing the new one.

See “Installing WebPAM PRO onto Windows” on page 40 or “Installing WebPAM PRO onto Linux” on page 49.

Logging into WebPAM PRO

The new version of WebPAM PRO has the same login procedure as previous version. See “Logging into WebPAM PRO” on page 58 or page 109.

Appendix C: Battery Backup Unit

The Battery Backup Unit (BBU) maintains power to the cache on the SuperTrak EX Controller card, when a power failure occurs to the Host PC. The failure could be due to a problem with the PC's power supply, a cessation of electrical service, or an accidental disconnection of the power cable.

When power is interrupted, any data in the controller's cache is lost. The BBU maintains power to the cache so that any data stored there is saved until it can be written to a physical drive.

The BBU is available as a kit, sold separately from the SuperTrak EX Controller card.

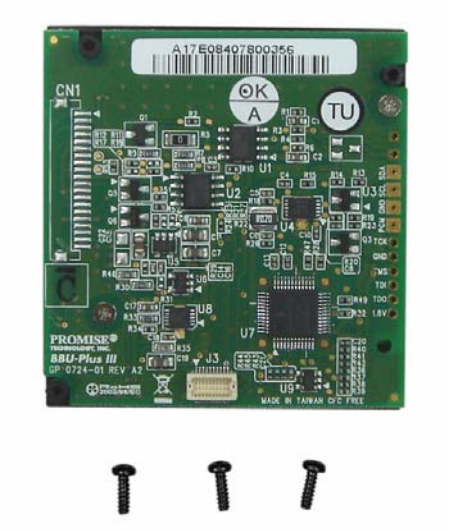
- SuperTrak EX4650 and EX8650 take BBU-Plus II or BBU-Plus III
- SuperTrak EX8654, EX8658, and EX16650 take BBU-Plus III.

Be sure you obtain and install the correct kit for your controller.

The BBU kit includes the following components:

- Battery Assembly – Includes a lithium battery and holder
- Mounting screws (3)

Figure 1. The BBU-Plus III kit



Installing the BBU

Warning

The electronic components on the SuperTrak EX Controller cards are sensitive to damage from Electro-Static Discharge (ESD). Observe appropriate precautions at all times when handling the SuperTrak card or its subassemblies.

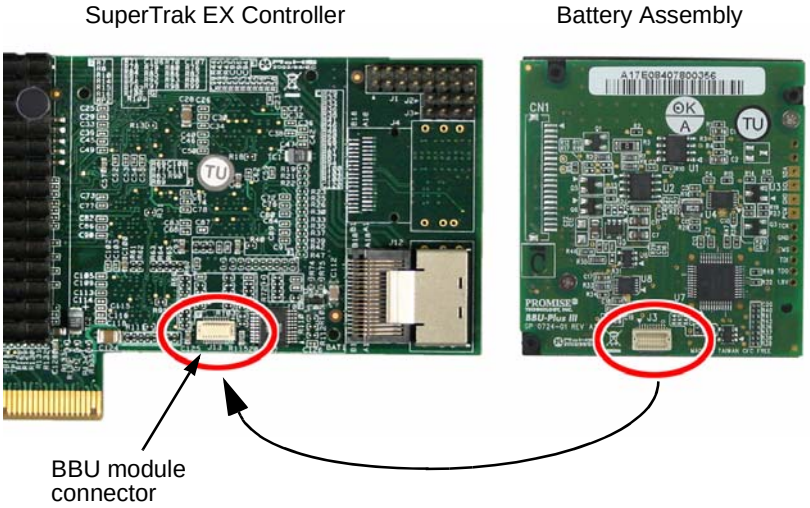
Warning

Before installing the BBU onto SuperTrak EX Controller card, backup any important or useful data. Failure to follow this accepted PC practice could result in data loss.

To install the BBU onto your SuperTrak EX Controller card in the Host PC:

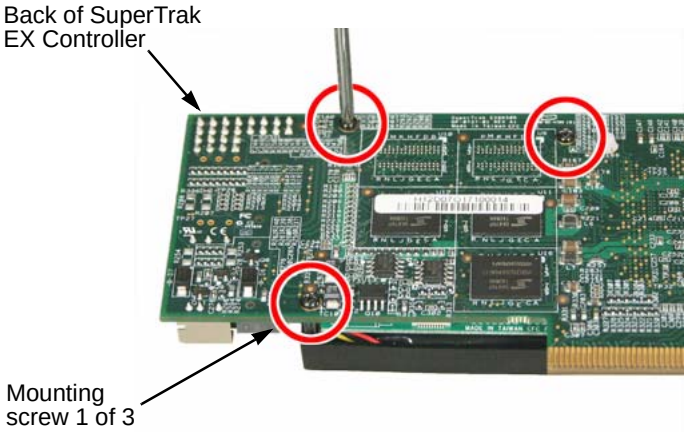
1. Power down your system.
2. Remove the cover of your system.
3. Detach the SAS multi-lane cables from the SuperTrak EX Controller card.
4. Remove the screw holding the SuperTrak EX Controller card to the system case.
5. Gently pull the SuperTrak EX Controller card out of the PCI-Express slot and remove it from the system.
6. Place the SuperTrak EX Controller card on an anti-static surface with the connectors facing up.
7. Attach the BBU module connector on the Battery Assembly to the BBU module connector on the SuperTrak EX Controller card. See Figure 2.

Figure 2. BBU module connectors on EX4650. Other models are similar



8. From the opposite side of the SuperTrak EX Controller card, insert and snug the three screws to secure the Battery Assembly.

Figure 3. Three screws secure the Battery Assembly. The EX4650 is shown. Other models are similar



9. Install the SuperTrak EX Controller card back into its PCI-Express slot.

10. Replace the screw holding the SuperTrak EX Controller card to the system case.
11. Attach the SAS multi-lane cables to the SuperTrak EX Controller card.
12. Replace the cover of your system.
13. Power-up the system and launch WebPAM PRO.

    See “Logging into WebPAM PRO” on page 109.

After installation and power-up, a new battery takes several hours to charge. From that time, it should show Fully Charged. See “Viewing Battery Information” on page 145.

The BBU module is covered by a one-year warranty. See “Limited Warranty” on page 280.

Appendix D: LED Backplane Connections

- Schematic Diagrams (below)
- Direct LED Display (page 297)
- Aggregate LED Display (page 297)
- Global LED Display (page 298)

Schematic Diagrams

To set up LED configuration for your enclosure or PC, make your backplane connections as shown below. You can make connections for:

- Aggregate LEDs
- Global LEDs in two colors
- Direct connection – Individual fault and activity LEDs

  For SuperTrak EX8654 and EX8658, note that only the *interior* SAS Ports have individual LED pins.

For more information, see “Installing the SuperTrak Card” on page 9 and the user manual for your PC or enclosure.

Figure 1. SuperTrak Aggregate and Global LED backplane connections

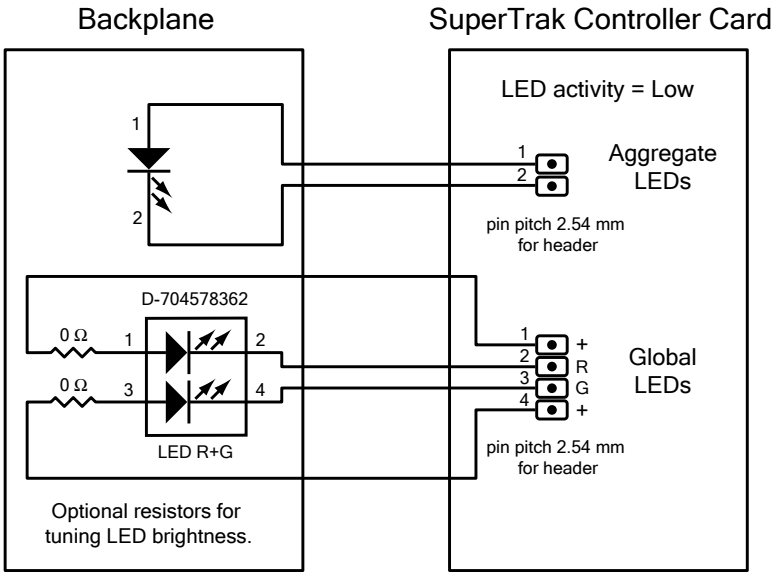
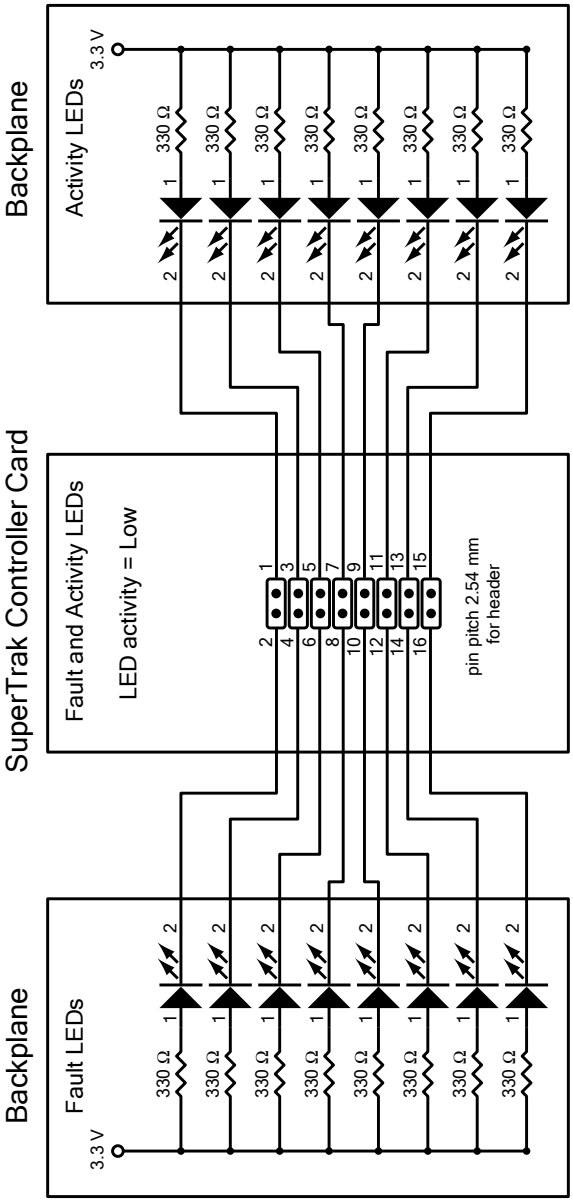


Figure 2. SuperTrak fault and activity LED connections



For LED status and behavior information, see the tables on the following pages.

Direct LED Display

Direct LEDs, glow and blink in response to the SuperTrak's firmware status.

Fault LED	Activity LED	Firmware Status
OFF	OFF	No physical drive
ON	ON	Unconfigured physical drive
OFF	ON	Configured physical drive – Status OK
ON	ON	Configured physical drive – Status Not OK
OFF	ON	Global spare drive – Status OK
ON	ON	Physical drive – Status Dead
ON	ON	Stale condition
Blink	ON	Rebuilding
OFF	Blink	Activity
Blink	ON	Locate physical drive
Blink	ON	Locate logical drive
Blink	ON	Locate disk array

For more information, see:

- "Managing Physical Drives" on page 90 or page 149
- "Managing Disk Arrays" on page 92 or page 156
- "Managing Logical Drives" on page 95 or page 172
- "Managing Spare Drives" on page 99 or page 178

Aggregate LED Display

Aggregate LEDs glow or blink in response to Storage Device (physical drive) activity.

LED	Storage Device Status
OFF	No activity
ON	Storage device (physical drive) activity

Global LED Display

Global LEDs glow in response to Logical Drive status.

LED	Logical Drive Status
Dark	System off
Green	Normal
Amber	Logical Drive Critical
Red	Logical Drive Offline

When a Global LED glows amber or red, you must diagnose and resolve the logical drive problem in the SuperBuild BIOS or in WebPAM PRO.

See “Chapter 8: Troubleshooting” on page 261.

Index

Numerics

10GBTruncate 247
2 TB limitation 245

A

About This Manual 1
Adaptive Writeback Cache 145, 246
add
  host 122
  subsystem 122
Agent, WebPAM PRO 38, 123, 129
airflow, PC or server 8, 272
alias
  controller 144
  disk array 93, 94, 161
  logical drive 96, 98, 161, 165
  physical drive 152
  subsystem 132
Auto Rebuild enable 137
axles
  RAID 50 235
  RAID 60 238
  specify number 97, 161

B

background activity
  run 138
  settings 137
  view 136
backplane, LED connections 295
battery
  backup unit (BBU) 291
  information 145
  not charging 272
BIOS
  downloading 289
  SuperTrak 18, 85
blank browser screen 272
block size, see stripe size 244
browser screen, blank 272
browser support for WebPAM PRO 4, 39
buzzer 106, 261
  information 147
  settings 146
  silencing 146
  testing 146

C

capacity
  disk array 92
  logical drive 96, 162, 165
  physical drive 90
  spare drive 179
capacity coercion
  defined 246
  settings 144
check table 176
CIM
  client settings 129
  server settings 129
clear
  event logs 104
  NVRAM event log 136
  orphan watermark 145
  runtime event log 135
  statistical data 132
CLI
  commands, listed 190

CLI, cont.
install
FreeBSD 36
Linux 29
VMware 37
Windows 23
notes, conventions 189
open 28, 185
start 28, 185
Client/Server, WebPAM PRO 123
connection, in-band versus out-of-band 123
controller
alias 144
information 89, 142
selection 89
settings 144
statistics 144
create
disk array 19, 93, 157
logical drive 20, 96, 165
spare drive 99, 179
user 120
critical logical drive 267, 270

D

dedicated spare drive 248
degraded logical drive 172
delete
disk array 94, 163
Event Frame 116
host 123
logical drive 98, 166
scheduled activity 141
spare drive 101, 180
subsystem 123
user 120
dimensions, SuperTrak card 6
disk array
capacity 92
create 19, 93
create advanced 161
create automatically 158
create express 159
create manually 161
delete 94, 163
expansion 253
information 92, 163
list 92
locate 156
migrate 167, 248
name or alias 93, 94, 161
no mixing HDD and SSD 17, 93, 100, 158, 159, 161, 191, 220
prepare for transport 171
rebuild 168, 270
run Media Patrol 169
run PDM 169
settings 94, 164
status 93, 163
transitioning 170
view 156
downloading
BIOS 289
drivers 63
firmware 289
WebPAM PRO 290
drivers
downloading 63
FreeBSD 80
installation media 64
Miracle Linux 79
openSUSE Linux 77
RedHat Linux 74
SuSE SLES Linux 78
Windows Server 2003 70

drivers, cont.
Windows Server 2008 66
Windows Vista 68
Windows XP 72

E

email
messages 265
service settings 127
status 126
test 128
enable
Auto Rebuild 137
Media Patrol 137
SMART 144
enclosure
IDs 15
information 148
JBOD 14, 16
polling interval 145
SGPIO 15
SuperSwap 16
third party 149, 156, 173, 182
virtual 15, 149, 156, 173, 182
VTrak 14, 150, 157, 173, 182
error block threshold setting 137
Event Frame
deleting 116
refresh time 128
saving 116
viewing 115
event logs
clear 104
SuperBuild 103
expansion 167, 248
ranges of 253
Extended SMTP 128

F

FAQs
installation 275
physical drives 274
post installation 276
pre-installation 273
find failed drive
SuperBuild 267
WebPAM PRO 268
firmware
downloading 289
update 124, 132
first-time setup, WebPAM PRO 60
Forced Read Ahead Cache 145, 246
format logical drive 248, 285
FreeBSD
installing
CLI 36
driver 80

G

GBTruncate 246
global spare drive 248
GRPRounding 247

H

Header 113
health, subsystem 133
host
add 122
delete 123
information 130
hot spare drive 248

I

ID numbers and SAS connections 15
in-band versus out-of-band 123
Inconsistent Block Table 177

information
battery 145
buzzer 147
controller 142
disk array 92, 163
enclosure 148
host 130
logical drive 95, 183
logical drives 172, 173
physical drive 90, 151
spare drive 99
subsystem 131
subsystem/host 122
user 118
initialization
settings 137
initialization, logical drive 97, 162, 166, 175, 247
installing
BBU kit 292
CLI
FreeBSD 36
Linux 29
VMware 37
Windows 23
FreeBSD driver 80
Miracle Linux driver 79
openSUSE Linux driver 77
RedHat Linux driver 74
SuperTrak EX Controller card 9
SuSE SLES Linux driver 78
VMware driver 82
WebPAM PRO
Linux 49
Windows 40
Windows Server 2003 driver 70
Windows Server 2008 driver 66
installing, cont.
Windows Vista driver 68
Windows XP driver 72

J

Java Runtime Environment 39
JBOD enclosure 14, 16, 150, 157, 173, 182

L

language, WebPAM PRO 115
LED behavior and SuperTrak status 262, 297
LED pins
backplane 295
SuperTrak 12
Linux
installing
drivers 74–79
WebPAM PRO 49
list
disk arrays 92
logical drives 95
physical drives 90, 149
scheduled activities 139
spare drives 99, 178
locate
disk array 156
logical drive 173, 182
physical drive 149
logging into WebPAM PRO 58, 109
logging out of WebPAM PRO 117
logical drive
2 TB limitation 245
axles 97, 161
capacity 21, 96, 162, 165
check table 176
create 20, 96, 165
critical 267, 270

degraded 172
delete 98, 166
information 95, 172, 173, 183
initialization 97, 162, 166, 175, 247
list 95
list of all 182
locate 173, 182
name or alias 21, 96, 98, 161, 165, 174
offline 267
partition and format 248, 285
RAID level 21, 96, 161, 165
read cache policy 22, 97, 98, 162, 165, 175
Redundancy Check 176
sector size 21, 96, 162, 165
settings 98, 174
statistics 174
status 95, 96, 172
stripe size 21, 96, 162, 165
synchronizing 166, 174
write cache policy 22, 97, 98, 162, 166, 175
login screen, WebPAM PRO 59, 111

M

maintenance user 120
Management View 114
Media Patrol
and PDM 255
defined 255
enable 137
run 138
run on disk array 169
scheduling 139
settings 137
migrate
disk array 167, 248
settings 137
multi-lane SAS cable 12, 292, 294

N

NVRAM event log
clear 136
save 136
view 135

O

offline logical drive 267
online expansion 167, 248
orphan watermark, clear 145
OS support for WebPAM PRO 3, 38
out-of-band versus in-band 123
overview of SuperTrak 2

P

partition logical drive 248, 285
password
change 119
WebPAM PRO 59, 111
PCI-Express slot 9, 292
PDM
and Media Patrol 255
defined 255
running on a physical drive 138
running on disk array 169
settings 137
triggers 137, 255
PFA condition 152, 269
Phys
enclosures 15
EX16650 12
EX4650 10
EX8650 10
EX8654 11
EX8658 11
physical drive ID ranges 15

physical drive
alias 152
capacity 90
capacity coercion 144, 246
configuration status 151
find failed 267, 268
global settings 150
IDs 15
information 90, 151
list 90, 149
locate 149
management 90
operational status 151
PDM 138, 169
PFA condition 152, 269
problems 91, 269
stale condition 152, 269
statistics 151
status 164
polling interval 145
popup message 265
power user 120
Predictive Data Migration, see PDM 255
problems
logical drive 267
physical drive 91, 269
Product Overview 2

R

RAID
choosing a RAID level 240
introduction to 227
VTrak subsystem 148
RAID level
logical drive 96, 161, 165
migrate 167, 248
RAID 0
applications 240
description 228
RAID level, cont.
RAID 1
applications 240
description 229
RAID 10
applications 242
description 233
RAID 1E
applications 241
description 230
RAID 5
applications 241
description 231
RAID 50
applications 243
description 234
RAID 6
applications 242
description 232
RAID 60
applications 243
description 237
recommendations 240
read cache policy
defined 246
logical drive 97, 98, 162, 165
Read Check Table 177
reassigned block threshold setting 137
rebuild
disk array 168, 270
settings 137
red X 265
RedHat, WebPAM PRO icon in application menu 57
Redundancy Check
run on logical drive 176
scheduling 139
settings 137
refresh interval, Event Frame 128
refresh screen, WebPAM PRO 130

returning product for repair 282
revertible spare drive 170, 178, 179, 248
run
background activity 138
Media Patrol 138
Redundancy Check 176
runtime event log
clear 135
save 134
view 134

S

SAS
breakout cable 15
connections and ID numbers 15
data cable 16
diamond port 14
expanders 15, 16, 17
fanout cable 14
multi-lane cable 9, 12, 14, 292, 294
phys and port IDs 15
save
Event Frame 116
NVRAM event log 136
runtime event log 134
scheduled activities
delete 141
list 139
scheduling
Media Patrol 139
Redundancy Check 139
Spare Check 139
sector size
defined 244
logical drive 96, 162, 165
settings
background activities 137
buzzer 146
capacity coercion 144
CIM client 129
CIM server 129
controller 144
disk array 94, 164
email service 127
error block threshold 137
logical drive 98, 174
other users 118
physical drives 150, 152
reassigned block threshold 137
SMART logging 155
spare drives 100, 180
user 119
privileges 124
user privileges 120, 130
web server 126
SGPIO enclosure 15
silencing the buzzer 146
SMART Log
basic information 153, 154
settings 155
SMART, enable 144
Software Management 126
Spare Check
running 181
scheduling 139
spare drive
capacity 179
create 99, 179
dedicated to array 100, 179
dedicated to disk arrays 178
defined 248
delete 101, 180
information 99

spare drive, cont.
list 99, 178
physical drive ID 99
revertible 100, 178, 179
settings 100, 180
spare check 181
status 99, 178
specifications 6
stale condition 152, 269
statistics
clear 132
controller 144
logical drive 174
physical drive 151
status
disk array 92, 93, 163
email 126
logical drive 93, 95, 96
logical drives 172
physical drive 90, 151, 164
spare drives 99, 178
subsystem 133
web server 126
Storage Network 116
stripe size 21
defined 244
logical drive 96, 162, 165
subsystem
add 122
alias 132
delete 123
health 133
information 131
JBOD 14, 16
subsystem/host information 122
super user 120
SuperBuild
accessing 85
background activity 102
buzzer 106, 261
SuperBuild, cont.
controller information 89
controller selection 89
enter 18
event logs 103
logical drive management 95
main menu 18, 88
physical drive management 90
spare drive management 99
Time Sync 105
SuperSwap enclosure 14, 16
SuperTrak
Advanced Design 4
Compatibility 5
installing 9
LED behavior 262, 297
LED pins 12
overview 2
specifications 6
unpacking 7
XOR microprocessor 2
SuperTrak BIOS 18, 85
critical screen 86
normal screen 86
offline screen 87, 264
Synchronization
settings 137
synchronizing a logical drive 166, 174
system configuration, view 141

T

TableRounding 247
technical support, contacting 277
temperatures, operating 6, 8, 272
test email 128
testing the buzzer 146
Time Sync 105
Tomcat server 127

Transition
automatic 258
defined 256
disk array 170
manual 258
settings 137
transport, prepare disk array 171
Tree View 113

U

update firmware 124, 132
user
create 120
delete 120
information 118
interface, WebPAM PRO 112
name in WebPAM PRO 59, 111
password, change 119
privileges 120, 124, 130
privileges defined 120
settings 119
settings of other users 118
Utility Server 38, 129

V

view
background activities 136
disk array 156
NVRAM event log 135
runtime event log 134
scheduled activities 139
system configuration 141
view-only user 120
virtual enclosure 15
VMware
installing
CLI 37
drivers 82
VTrak JBOD 14, 16, 150, 157, 173, 182
VTrak JBOD enclosure 133
VTrak RAID subsystem 148

W

warranty 280
web server
settings 126
status 126
WebPAM PRO
Agent 38, 123, 129
alias for subsystem 132
background activity
run 138
schedule 139
settings 137
battery information 145
blank screen 272
browser support 4, 39
buzzer 146
CIM client settings 129
CIM server settings 129
Client/Server 123
components 38
controller
info 142
settings 144
statistics 144
description 3
disk array
auto create 158
delete 163
express create 159
info 163
locate 156
manual create 161
Media Patrol 169
migrate 167

WebPAM PRO, cont.
disk array, cont.
PDM 169
prepare for transport 171
rebuild 168, 270
settings 164
transition 170
display language 115
downloading 290
email service 127
enclosures 148
Event Frame 115
event frame refresh 128
extended SMTP 128
External SSL Security option 45, 54
find failed driive 268
firmware update 124, 132
first-time setup 60
Header 113
host
add 122
delete 123
info 122
icon in RedHat application menu 57
installing
Linux 49
Windows 40
Java Runtime Environment 39
logging in 58, 109
logging out 117
logical drive
check table 176
create 165
delete 166
info 172, 173, 183
initialize 175
locate 173, 182
WebPAM PRO, cont.
logical drive, cont.
Redundancy Check 176
settings 174
statistics 174
login screen 59, 111
Management View 114
Media Patrol 138
NVRAM event log 135
orphan watermark 145
OS support 3, 38
password 59, 111
password, change 119
PDM 138
physical drive
global settings 150
info 151
locate 149
PFA condition 152, 269
settings 152
stale condition 152, 269
statistics 151
refresh screen 130
Regular connection 58, 110
runtime event log 134
Secure connection 58, 110
session time out setting 127
spare drive
create 179
delete 180
settings 180
spare check 181
statistical data, clear 132
Storage Network 116
subsystem
add 122
delete 123
health 133
info 122
Tomcat Server 127
Tree View 113

WebPAM PRO, cont.
user
create 120
delete 120
interface 112
name 59, 111
password 119
privileges 124, 130
settings 118
Utility Server 38, 129
Web Server 126
Windows
installing
drivers 66–72
WebPAM PRO 40
write cache policy
defined 246
logical drive 97, 98, 162, 166
Write Check Table 177

Y

yellow ! 265